THE LANCET

A Journal of British and Foreign Medicine, Surgery, Obstetrics, Physiology, Chemistry, Pharmacology, Public Health, and News.

Telegrams—LANCET, WESTRAND LONDON *Telephones*—GERRARD 4314 & 4315 *Offices*—423, Strand, London, W.C.2

No. XVII. OF VOL. II., 1925. **No. 5330. Vol. CCIX.** LONDON, SATURDAY, OCTOBER 24, 1925. Founded 1823. Registered as a Newspaper. Published Weekly. **Pp. 120—Price 1s.** Annual Subscription Inland £2 2s. Abroad £2 10s

OXFORD MEDICAL PUBLICATIONS.

SEE PAGE 4.

22 Illustrations. 10s. 6d. net. Postage 4d.

INGUINAL HERNIA, IMPERFECTLY DESCENDED TESTICLE AND VARICOCELE.
By PHILIP TURNER, M.S., F.R.C.S.,
Assistant Surgeon, Guy's Hospital.
London: J. & A. Churchill, 7, Great Marlborough-street, W. 1.

A HANDBOOK OF AURAL SURGERY
By WILLIAM WILSON,
Oto-Laryngologist. St. John's Ear Hospital, &c., &c., Manchester.
JOURNAL OF LARYNGOLOGY—"Can be confidently recommended."
Sherratt & Hughes 15s. net. Manchester.

BAINBRIDGE & MENZIES' ESSENTIALS OF PHYSIOLOGY.
FIFTH EDITION. Edited and thoroughly Revised by C. LOVATT EVANS, D.Sc. (Lond.), M.R.C.S., L.R.C.P., F.R.S., Professor of Physiology, University of London, at St. Bartholomew's Medical College. With Illustrations. 8vo. 14s. net.
Considerable additions have been made to keep the matter up-to-date, and some new figures have been added.
Longmans, Green & Co., 39, Paternoster Row, London, E.C. 4.

BY CHARLES J. HEATH, F.R.C.S.
Consulting Aural Surgeon, Metropolitan Asylums Board; late Surgeon, Throat Hospital, Golden Square, London.
OTITIS MEDIA (MASTOID DISEASE):
ITS SYMPTOMS, DIAGNOSIS, PROGNOSIS AND TREATMENT BY MODERN METHODS, thus saving the hearing of the discharging ear with perforated drumhead.
Price 5s. net.
"We have no hesitation in describing Heath's paper as epoch-making."—ST. BARTHOLOMEW'S HOSPITAL JOURNAL.
"This work is recommended to specialists and even to those who are not."—L'OTO RHINO LARYNGOLOGIA INTERNATIONALE.
Baillière, Tindall & Cox, 8, Henrietta-street, London, W.C.2.

ABRAMS' METHODS OF DIAGNOSIS AND TREATMENT.
Edited by Sir JAMES BARR, C.B.E., D.L., F.R.S.E., LL.D., M.D., F.R.C.P. Demy 8vo, 5s. net.
"I can wholeheartedly commend this book to all those medical men and intelligent laymen who are interested in the advancement of the diagnosis and treatment of disease. It reflects great credit on all those who are carrying out Abrams' methods in this country: they have achieved great things and will achieve more. I should like to see a large number of the intelligent young members of our profession take up this work: there is ample scope for thousands more than the very able men already in the field."—SIR JAMES BARR.
Wm. Heinemann (Medical Books), Ltd., 20, Bedford-street, London, W.C. 2.

With 79 Illustrations on 40 Plates and 1 Text-figure. Demy 8vo. 12s. 6d. net; postage 6d.

INTERNAL DERANGEMENTS OF THE KNEE-JOINT.
THEIR PATHOLOGY AND TREATMENT BY MODERN METHODS.
By A. G. TIMBRELL FISHER, M.C., F.R.C.S. Eng.
"Throughout the book there is evidence of exhaustive investigation by the judicial mind of a trained surgeon of wide experience. We cannot speak too highly of this valuable contribution to medical literature."—Extract from *Archives of Surgery*, Chicago.
"The most complete account of internal derangements of the knee that has been published in English."—BRITISH JOURNAL OF SURGERY.
London: H. K. Lewis & Co. Ltd., 136 Gower-street, W.C. 1.

In the Press. With 62 Illustrations. Demy 8vo.

MANIPULATIVE SURGERY.
PRINCIPLES AND PRACTICE.
By A. G. TIMBRELL FISHER, M.C., F.R.C.S.Eng.
London: H. K. Lewis & Co. Ltd., 136 Gower-street, W.C. 1.

TWO IMPORTANT NEW BOOKS.

PALFREY'S
THE ART OF MEDICAL TREATMENT.

MOOREHEAD & DEWEY'S
PATHOLOGY OF THE MOUTH.

See Saunders' Advertisement on Page 3.

STERILITY IN WOMAN:
ITS CAUSES AND TREATMENT.
By ROBERT A. GIBBONS, M.D., F.R.C.S.E.,
Gynæcologist to the Grosvenor Hospital for Women.
"It is written clearly, and should make a special appeal to the general practitioner . . . . . We can heartily recommend this useful and well-written book."—THE LANCET.
"The volume provides an admirable account of the whole subject. It is sufficiently full for the needs of the family practitioner, and is written in a refreshingly clear and lucid style."
—BRITISH MEDICAL JOURNAL.
With 44 illustrations, 12s. 6d. J. & A. Churchill, 1925.

NEUROLOGICAL FRAGMENTS.
By J. HUGHLINGS JACKSON, M.D., F.R.S., F.R.C.P.
With Biographical Memoir by JAMES TAYLOR, M.D., F.R.C.P., and including the Recollections of Sir JONATHAN HUTCHINSON and Dr. MERCIER. 12s. 6d. net.
Oxford University Press, Amen House, London, E.C.4.

DISEASES OF
THE MALE ORGANS OF GENERATION.
By KENNETH M. WALKER, F.R.C.S., M.A., M.B., B.C.
Price 12s. 6d.
"If andrology is fated to take its place in the overcrowded curriculum of medical study it could not have a more entertaining professor than Mr. Kenneth Walker."—BRITISH MEDICAL JOURNAL
Oxford University Press. Amen House, London, E.C.4.

AN INDISPENSABLE REFERENCE WORK.

NEW (THIRD) EDITION. **OSLER & McCRAE'S** **VOLUME I. JUST READY.**

MODERN MEDICINE

Edited by **THOMAS McCRAE,** M.D., F.R.C.P. Lond.

New Third Edition. In Six Royal Octavo Volumes of about 900 pages each, Illustrated, and desk index volume. Cloth. Price **42s.** net per volume. (Postage 1s.) Orders taken for complete sets only.

¶ **The endeavour throughout is to make the work useful to the man in general practice.**

VOLUME II. READY ABOUT DECEMBER 1ST.
VOLS. III.-VI. WILL BE ISSUED AT ABOUT THREE MONTHLY INTERVALS.

HENRY KIMPTON, 263, HIGH HOLBORN, LONDON, W.C.1.

IODINE IN TUBERCULOSIS

Iodine, administered in adequate doses, is a direct and specific remedy for tuberculosis (early and second period).

IODEOL

Electro-Chemical pure stable Colloidal IODINE.
(oleaginous suspension 20%)

IS THE IDEAL FORM OF IODINE TREATMENT
and is the most harmless internal disinfectant in all infectious diseases.

It admits of the administration of large doses—intramuscularly or orally, possesses all the chemical properties of pure Iodine—leucopoietic, antitoxic, anti-infectious—and, by virtue of its colloidal state, possesses powerful catalytic properties, immediately stimulating the leucocytic and humoral defences, and raises the opsonic index.

IODINE IN INFLUENZA

IODEOL injected in a daily dose of 2 c.c. rapidly ameliorates all the symptoms of the disease and prevents pulmonary complications.

Ampoules of 1 c.c.—intramuscular or intratracheal injections—contain 3 grains of iodine.

May we send you Literature and Sample?

NORMAL HORSE SERUM

Collected under Aseptic conditions and scientifically dried in vacuo is now available in Capsules and Tablets for the Treatment of

HÆMORRHAGES, ANÆMIAS

SERUM OLIVIERO

is presented in 2 forms

CAPSULES
SERUM OLIVIERO

Gluten-coated Capsules from which the serum is liberated in the intestines. Prescribed when a local action is desired or to increase the coagulating power of the blood in

HÆMORRHAGES, ATONICITY of the MUCOSA, METRORRHAGIA.

TABLETS
SERUM OLIVIERO

Tablets of Serum (combined with Hepatic Extract and Iron) are Leucostimulant and Hæmatopoietic and also provide for the supply of Hæmoglobin and its fixation. Prescribed with excellent results in

ANÆMIAS.

A POCKET HÆMOGLOBINOMETER will be sent FREE on request together with Samples and Literature.

UROCÉDROL

Essential Oil of CEDRUS ATLANTICA in combination with Camphorate of Urotropine.

Superior to SANTAL OIL in the TREATMENT OF DISEASES OF THE URINARY TRACT.

No Eructations or Gastric Disturbance

Sample and Literature on request.

MODERN PHARMACALS, Ltd., 2, Calthorpe St., London, W.C. 1
Telephone: **Museum 564.** Telegrams: **Pharmacals, Kincross, London.**

THE LANCET

No. 5330. LONDON, SATURDAY, OCTOBER 24, 1925. CCIX.

CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT.

THE HARVEIAN ORATION on Some Developments of Harvey's Doctrine: "Omne Vivum ex Ovo." By Sir FREDERICK MOTT, K.B.E., M.D., F.R.S. .. 847

CAMERON LECTURES. By Prof. HARVEY CUSHING, C.B., F.R.C.S. Lecture I. The Third Circulation and Its Channels.—(*Illustrated*) 851

ORIGINAL ARTICLES.

Anatomically Irregular Sphenoidal Sinusitis with Optic Neuritis, Localised by the Suction Syringe: with Two Examples. By PATRICK WATSON-WILLIAMS, M.D.—(*Illustrated*) 858

The Relation of Nephritis in Egypt to Intestinal Infection. By H. B. DAY, M.D., F.R.C.P.—(*Illustrated*) 860

Respiratory Catarrh in Children. By RICHARD C. CLARKE, M.B., M.R.C.P. 864

MEDICAL SOCIETIES.

Royal Society of Medicine: Section of Therapeutics and Pharmacology: Some Difficulties in the Use of Insulin 866

Newcastle-upon-Tyne and Northern Counties Medical Society 868

REVIEWS AND NOTICES OF BOOKS.

Taylor's Practice of Medicine. By E. P. Poulton, M.D. Assisted by C. Putnam Symonds, M.D., and H. W. Barber, M.B. 869

A System of Clinical Medicine. By Thomas Dixon Savill, M.D. 869

The Principles and Practice of Medicine. By the late Sir William Osler, M.D., F.R.S. Revised by Prof. Thomas McCrae, M.D.. 869

A Synopsis of Medicine. By H. Letheby Tidy, M.D. 870

Clinical Features of Heart Disease. By Prof. Leroy Crummer, M.D. 870

Some Encouragements in Cancer Surgery. By G. Grey Turner, F.R.C.S. .. 870

Chirurgische Operationslehre. By Prof. Dr. Friedrich Pels Leusden . 870

The Evolution of Anatomy. By Charles Singer, M.D. 870

A Text-book of Oarsmanship. By Gilbert C. Bourne 871

Journal of Industrial Hygiene 871

REPORTS AND ANALYTICAL RECORDS.

"Tabloid" Digitalis Leaf (1 gr.); and "Tabloid" Iodicin (0·03 g.).—Agarol Brand Compound (Warner); and Idosal.—Double Cream Soya Milk and Yeast; and Soya Milk (Synthetic Milk in Powder Form) Double Cream (Unsweetened) .. 872

NEW INVENTIONS.

A Modified Tuffier's Thoracotomy Retractor (Cecil P. G. Wakeley, F.R.C.S.)—(*Illustrated*) 872

LEADING ARTICLES.

NON-UNION IN FRACTURES 873

THE MELANOMATA 873

A CONQUEROR OF INSECT PESTS 874

VACCINIA AND VARIOLA VIRUSES 874

ANNOTATIONS.

The Catarrhal Child 875

The Care of the Convalescent 876

Cancer-like Changes in Tissue Cultures 876

Vital Statistics of Scotland in 1924 877

Radiotherapy at Leeds ... 877

Pioneers in Tropical Medicine 877

Pepys and Science 878

Radiographic Diagnosis of Spinal Disease 878

German Medical Congress. 879

Athletics and Economy... 879

The Medical Officership of London County 880

MODERN TECHNIQUE IN TREATMENT.

CLXIV.—Treatment of Hydrocele, Hæmatocele, Varicocele, and Spermatocele. By PHILIP H. MITCHINER, M.D., M.S., F.R.C.S. 881

SPECIAL ARTICLES.

Scotland: James Mackenzie Institute for Clinical Research, St. Andrews.. 882

Ireland: The Health of Belfast 882

Paris: The Safety of Railway Travellers 883

Berlin: Visit of Spanish Medical Men 884

Public Health Administration: Administrative Machinery: Japan 885

The London Medical Exhibition: Instruments and Appliances 886

The Manchester Babies' Hospital.—(*Illustrated*).. 888

PUBLIC HEALTH SERVICES.

Reports of Medical Officers of Health: Birmingham.—Bradford.—Leicester . 889

Infectious Disease in England and Wales 890

CORRESPONDENCE.

The Sanatorium and After (Sir James K. Fowler).. 892

Luminal, Borax, or Bromide in Epilepsy (Dr. C. Worster-Drought)..... 892

Ununited Fractures (Mr. J. W. Dowden) 892

Proposed Memorial to the late Mr. Hamilton Drummond (Mr. G. Grey Turner) 893

The Danger of Self Insulin Injection (Dr. A. C. M. Elman) 893

Longevity of the Learned. 898

The "Euphoros" Self-Adjusting Arm-sling (Prof. Van Leersum) .. 898

Apoplexy of the Soft Palate (Dr. W. R. Bates)..... 898

OBITUARY.

Charles Frederick Sonntag, M.D., Ch.B. 890

Rupert Cecil Chicken, F.R.C.S., L.R.C.P. 891

Harold Maxwell Lefroy, M.A., F.E.S., F.Z.S. 891

Edmund Archibald Armstrong, M.A. 891

THE SERVICES.

Royal Naval Medical Service.—Royal Army Medical Corps.—Royal Air Force.—Indian Medical Service.—Lectures on Hygiene to Cadets 887

MEDICAL NEWS

University of Oxford 894

University of Glasgow 894

University of Dublin, School of Physic, Trinity College 894

Congress on Venereal Disease at Paris..... 860

Coöperation in Hospital Management 880

Naval Medical Compassionate Fund..... 881

Royal Portsmouth Hospital 887

St. Mary's Hospital for Women and Children.. 891

The L.C.C. and Immunisation against Diphtheria 894

The Society of Medical Officers of Health 894

Fellowship of Medicine and Post-Graduate Medical Association 894

University of Bristol: Association of Alumni (London Branch) 895

Vienna: Post-graduate Course 895

Royal College of Physicians of Ireland 895

Two Vacant Chairs of Medicine 895

Welsh School of Medicine . 895

Manchester and Salford Medical Charities 895

Manchester Medical School 895

Nottingham Medico-Chirurgical Society..... 895

Hospital of St. John and St. Elizabeth 895

Chester Maternity Hospital 895

Hospital Saving Association 895

King's College Hospital Debt 895

Medico-Legal Society 895

Chelsea Clinical Society .. 895

Medical Diary 896

Appointments.—Vacancies 896

Births, Marriages, Deaths 897

NOTES, COMMENTS, AND ABSTRACTS.

The Equable Cooling Power of Alpine Health Resorts. By LEONARD HILL, M.B., F.R.S., and BERNARD HUDSON, M.D., M.R.C.P. 897

Karlsbad Medical Week... 898

AFTER ONE HUNDRED YEARS.

On our 100th Anniversary we have been pleased to publish the following books:—

FOURNEAU'S ORGANIC MEDICAMENTS. Trans. by W. A. SILVESTER, M.Sc. 22 Illustrations. **15s.** net.

THRESH'S EXAM. OF WATER SUPPLIES. 3rd Ed. **25s.** net.

SYDNEY SMITH'S FORENSIC MEDICINE. 117 Illus. **21s.** net.

LITTLEJOHN'S FORENSIC MEDICINE. 183 Illus. **15s.** net.

JELLETT'S PRACTICE OF GYNÆCOLOGY. 5th Ed. **25s.** net.

EDEN & HOLLAND'S MIDWIFERY. 6th Ed. **21s.** net.

KOBY'S SLIT-LAMP MICROSCOPY OF THE LIVING EYE. Trans. by GOULDEN and HARRIS. **10s. 6d.** net.

FOSTER MOORE'S MEDICAL OPHTHALMOLOGY. 2nd. Ed. **18s.** n.

EDELMANN'S MEAT HYGIENE. 5th Ed. **25s.** net.

JACKSON'S INANITION AND MALNUTRITION UPON GROWTH AND STRUCTURE. 117 Illus. **30s.** net.

CHAVASSE & WRENCH'S ADVICE TO A MOTHER. 19th Ed. 28 Illustrations. **2s. 6d.** net.

BEAUMONT & DODDS' RECENT ADVANCES IN MEDICINE. 2nd. Ed. 40 Illus. **10s. 6d.** net.

EVANS' RECENT ADVANCES IN PHYSIOLOGY. 10s. 6d. net.

LAWRENCE'S DIABETIC LIFE. Its Control by Diet and Insulin. 10 Illus. **7s. 6d.** net.

MATTHES' DIFFERENTIAL DIAGNOSIS OF INTERNAL MEDICINE. 176 Illus. **£2 2s.** net.

TAYLOR & POULTON'S MEDICINE. 13th Ed. **28s.** net.

GOODHART & STILL'S DISEASES OF CHILDREN. 12th Ed. 68 Illustrations. **28s.** net.

HATSCHEK'S LABORATORY MANUAL OF ELEMENTARY COLLOID CHEMISTRY. 2nd. Ed. **7s. 6d.** net.

HATSCHEK'S INTRODUCTION TO PHYSICS & CHEMISTRY OF COLLOIDS. 5th Ed. **7s. 6d.** net.

WALLIS' PHARMACOGNOSY. 81 Illus. **7s. 6d.** net.

PARRY'S PERFUMERY. 2 Vols. **36s. net.**

J. & A. CHURCHILL.

GEORGE ALLEN & UNWIN, LTD.

Psychological Healing:

A Historical and Clinical Study.

By PIERRE JANET. **2 vols. £2 2s.**

Translated by E. and C. PAUL.

The aim of the work is to write a detailed history of mental healing, to enrich that history with the wealth of Janet's own clinical experience, to draw inferences as to the most successful methods now available, and to forecast the possibilities of future progress.

Principles of Psychotherapy.

By PIERRE JANET. **10s. 6d.**

Translated by H. M. and E. R. GUTHRIE.

"As a descriptive psychopathologist Janet is unrivalled. . . . The book is full of shrewd observation."—*Lancet.*

Rejuvenation.

The work of Steinach, Voronoff, and others.

By NORMAN HAIRE, Ch.M., M.B. **7s. 6d.**

"Its great value to the medical man is that it gives a review of the whole subject and guides one to deeper reading."—*Nature.*

Rejuvenation by Grafting.

By SERGE VORONOFF. **15s.**

"Dr. Voronoff is to be commended for his scientific honesty. He is undoubtedly doing good work. We heartily recommend the book."—*Outlook.*

40, MUSEUM STREET, LONDON, W.C.1.

JUST PUBLISHED.

A NEW EDITION (3rd).

THE MECHANISM and GRAPHIC REGISTRATION of the HEART BEAT

By SIR THOMAS LEWIS.

Price 50/- net. Postage 1/-.

Specimen pages and abridged list of contents post free

SHAW & SONS, LTD., Medical Publishers, 7, 8 & 9, Fetter Lane, LONDON, E.C. 4.

STAMMERING, SPEECH DEFECTS.

BEHNKE METHOD. Estab. 1882. CASES, non-resident, treated at 39, Earl's Court Square, S.W.5, and, in residence, in the Summer holidays at Miss Behnke's house on the Chilterns.

"Pre-eminent success in the education and treatment of stammering and other speech defects."—*The Times.*

"Thoroughly physiological principles."—*The Lancet.*

"The method is scientifically correct and perfectly effective." *Guy's Hospital Gazette.*

"STAMMERING, CLEFT PALATE, SPEECH, LISPING." 3s. 9d. of Miss BEHNKE, 39, Earl's Court Square, S.W.5.

STAMMERING

W. J. KETLEY, "Tarrangower," Brondesbury, N.W.6

(Telephone: Willesden 435.)

30 years colleague of late B. BESLEY, Brampton Park, Huntingdon.

Those interested in the subject should write for his book, which will be sent post free.

Crown 4to. 208 pp. With 300 Radiographs and descriptive Text. **17/6** *net; postage* **9d.**

A DESCRIPTIVE ATLAS OF

RADIOGRAPHS OF THE BONES AND JOINTS

By **A. P. BERTWISTLE,** M.B., Ch.B., F.R.C.S.,
Late Resident Surgical Officer, General Infirmary, Leeds.

"The atlas consists of: (1) Illustrates the usefulness and method of making silhouette radiographs. (2) A comprehensive series of skiagrams of normal bones and epiphyses. (3) A complete series of fractures of bones. (4) Depicts diseases of bones. (5) Shows the injuries and diseases of joints. (6) A collection of miscellaneous skiagrams. There is a brief but adequate description of each radiograph. Will be found most useful in surgical practice . . . the radiographs are all excellent."—*British Journal of Surgery.*

"This is an excellent book, clearly written, beautifully illustrated, and published in a fashion that leaves nothing to be desired."—*Medical Press and Circular.*

London: SIMPKIN & CO., Ltd.

Second Edition, fully revised and enlarged.
Large 8vo. 454 pp. 296 Illustrations. **30/- net;** *postage* **9d.**

ON MODERN METHODS OF

TREATING FRACTURES

By ERNEST W. HEY GROVES,

B.S., M.S., M.D., B.Sc. Lond., F.R.C.S. Eng.,

Professor of Surgery, University of Bristol; Surgeon, Bristol General Hospital; Examiner in Surgery, Universities of London, Liverpool, Leeds, and Sheffield.

"The author has given the surgical world a monograph of rare judgment and maturity . . . will serve as a model for sections on fractures in future text-books of surgery."—*Lancet.*

"Indispensable to every student of its subject."—*British Journal of Surgery.*

"An able exposition based on first-hand observation . . . a real modern presentment of bone surgery."—*Practitioner.*

Bristol: JOHN WRIGHT & SONS, Ltd.

Vol. II (1925) of the

EXTRA PHARMACOPOEIA

(18th EDITION) 728 + xiii pp.

By MARTINDALE & WESTCOTT,

is now ready, 20/- nett; 20/6 post free.

Concise and up-to-date information of special interest to medical men will be found under the following headings: ANALYTICAL ADDENDA TO MATERIA MEDICA, NUTRIMENTA, STERILISATION, IONTOPHORESIS, RADIOLOGY, RADIUM, ANTISEPTIC POWERS OF CHEMICALS AND DISINFECTANTS, MINERAL WATERS, MILK AND BUTTER ANALYSIS, BLOOD SUGAR ESTIMATION, URINE ANALYSIS, FOOD PRESERVATIVES, BACTERIOLOGICAL NOTES ON SPECIAL DISEASES, Etc.

"The volume contains a host of facts . . . . . and a remarkably large amount of new information."
—*British Medical Journal.*

LONDON: H. K. Lewis & Co. Ltd., 136 Gower Street, W.C.1.

The Harveian Oration

ON SOME DEVELOPMENTS OF HARVEY'S DOCTRINE

"OMNE VIVUM EX OVO."

Delivered before the Royal College of Physicians of London on Oct. 19th

BY SIR FREDERICK MOTT, K.B.E., M.D., F.R.C.P. LOND., F.R.S., LL.D. EDIN.,

CONSULTING PHYSICIAN, CHARING CROSS HOSPITAL; LATE DIRECTOR OF PATHOLOGICAL LABORATORIES, LONDON COUNTY MENTAL HOSPITALS; HON. DIRECTOR OF RESEARCH IN MENTAL DISEASES TO THE UNIVERSITY AND CORPORATION OF THE CITY OF BIRMINGHAM.

[AFTER referring to the greatness of Harvey as an investigator and to the value of his "De Generatione Animalium," Sir Frederick Mott described the growth of the knowledge of genetics since that work was published. The expansion of Harvey's dictum, *Omne vivum ex ovo* into Virchow's *Omnis cellula e cellula* had opened up a new chapter in physiology and pathology and the investigations which followed had thrown new light on the conceptions of fertilisation. The reviviscence of Mendel's great discovery (1865) of segregation of unit characters had awakened in 1900 an interest in the chromosome theory of heredity, and Sir Frederick Mott gave a brief summary of this theory, in so far as it applied to his subject. Turning to his own research into the function of reproduction and genetics in relation to certain mental diseases, he continued:]

From time immemorial the influence of the sexual function on physical structure, character, and conduct has been known, but it is only within recent times that experimental investigations and clinico-anatomical observations have shown that this influence is dependent upon an internal secretion of an interstitial gland of the testis and ovary respectively, which can function independently of the genetic structure. The testis secretes a hormone which determines, prior to birth, the physical and mental sexual characters, and, at puberty, the secondary sexual characters. The reproductive organs are functionally correlated with the endocrine system of glands, especially the cortex adrenalis, the pituitary, and the thyroid. As the sex instinct gradually matures, a progressive mental and bodily evolution takes place in the male and female, in accordance, not only with the innate dispositions due to sex, race, and familial ancestry, but with the evolution of character due to good or bad habit formations. Habits acquired in early life, although not germinal and transmissible, nevertheless form such stable organised reflex patterns in the nervous system as to be capable of profoundly influencing such inborn dispositions as the moral sense, the self-regarding sentiments, the emotions and passions, and their proper control. At the adolescent period a new great vital urge, stronger even than self-preservation, comes into being to energise all the organs and tissues of the body, especially the nervous system, for the supreme biological end of reproduction and preservation of the species.

THE INTERSTITIAL CELLS OF THE TESTIS.

I will now give a short account of my own investigations regarding the interstitial cells in man and their functions. Examination of the testis of a full-term twin fœtus showed tubules containing embryonic spermatogenic cells; between them, lying in loose connective tissue, were seen abundant polygonal cells with a round nucleus lying in an eosin-stained cytoplasm. Many of the cells had the appearance of young cells. There was plenty of evidence of nuclear mitosis, and I came to the conclusion that numbers of the cells had attained maturity and were on the way to a regressive atrophy, leaving only the nuclei. These cells contain a lipochrome substance and lipoid granules. I found that about the fourth month the seminiferous tubules are twice the size of those at birth; instead of being separated by loose connective tissue containing abundant Leydig cells, they are closely approximated, the Leydig cells have almost disappeared, and there are no lipoid granules visible. At the eleventh year I observed very little change in the size of the tubules and the interstitial cells are only discernible by examination with an oil immersion lens. Little or no interstitial lipoid is seen. There are commencing manifestations of nuclear activity and karyokinetic figures, but no spermatids nor spermatozoa. The Leydig cells do not reappear until puberty, when the generative function commences, and the sexual hormone from the interstitial cells begins again to pass into the circulation and determine the bodily and mental secondary sexual characters.

Seeing that the male sexual hormones are active for probably more than six months in prenatal and postnatal periods, it follows that this influence must have been operating on all the somatic cells, including the nervous system, during all that time. If there be an elective storage of the sexual hormone in the nervous system, as Steinach's experiments indicate, then a masculine behaviouristic tendency may thus early be engraven upon the nervous system. Moreover, by the sensitising influence of the testicular hormone, the primary male characters are thus early in life made dominant in all the bisexual somatic cells. The belief in the occurrence of male sex-dominance at an earlier age than the existence of a secretion of the female sex hormone has received fresh support in the very interesting solution of the riddle of the "free martin" by Lillie. He reports a case in which the female characters of a female twin calf were more or less completely suppressed and certain male structures developed as a result of anastomosis of the placental blood-vessels with those of the associated male twin calf. This can only be explained by the influence of a soluble and diffusible hormone derived from the male and carried to the female by the circulating blood. We can thus understand why castration, even in early life, cannot remove entirely the hormonic effect thus early impressed upon the nervous system, nor eliminate entirely the physical primary male sexual characters already determined in the tissues.

OTHER ENDOCRINE INFLUENCE.

There can be no development of sex characters without all the other organs of internal secretion participating; all of the ductless glands, and especially the thyroid, the pituitary, and the adrenal, are influenced by the internal secretion of the sexual glands, and the latter are undoubtedly influenced by the former; indeed, there is a harmonious functional interrelation between the reproductive organs and the whole endocrine system. I have recently investigated a case of dystrophia adiposo genitalis affecting an epileptic imbecile, aged 29 at death. There was no hair on the face; there was polyuria and marked sugar tolerance; there was infantilism of the external genitals; the atrophous undescended testes were no larger than peas and showed microscopically both interstitial cells and spermatogenic cells replaced by fibrous tissue and fibroblasts. Associated with this testicular atrophy was a markedly atrophous pituitary and atrophous thyroid gland; moreover, the cortex adrenalis was much diminished in thickness.

The increase in growth of the long bones of youths castrated in early life is due to retardation of endochondral ossification, and supports the view that the internal secretion of the testis controls calcium metabolism. Similarly in the female there is a relation between the ovarian internal secretion and calcium metabolism, for removal of the ovaries benefits and sometimes cures osteomalacia. Again, the release of calcium from the pelvic bones during pregnancy and parturition may be regarded as a physiological process brought about by an internal secretion of the ovary, the phosphate of lime thus released being utilised by the mammary gland. It is generally assumed that the source of the sexual hormone of the female is connected with the development of the Graafian

follicle, and that the cells of the zona granulosa and the internal thecal cells of the follicle secrete a specific soluble substance which passes into the blood and determines the female characters. It may, therefore, be supposed that a continuous conversion of primordial follicles into immature Graafian follicles, from earliest infancy onwards, provides a feminising hormone to counteract the pre-established male dominance in the bisexual cells of the body. This formation of atretic follicles, and subsequently corpora atretica, continues until menstruation occurs and maturation with dehiscence of the follicles takes place. I have found that ovaries at birth and in early infancy contain numerous immature Graafian follicles. Should this follicle formation not occur to a normal physiological extent, it is conceivable that, having regard to the selective action of the hormone on the central nervous system, as revealed by Steinach's experiments, there would be a tendency to masculinisation, especially revealed in mental qualities. The whole of the somatic cells of male and female are, until the dawn of adolescence, engaged in growth and self-preservation, in preparation for reproduction and preservation of the species.

Disorders and diseases of the mind have long been associated with two conditions—namely, heredity and the critical periods of life (adolescence, when the sex instinct matures, and the climacterium, when the sex instinct wanes). These are physiological conditions. Pregnancy, parturition, and lactation in the female are likewise physiological conditions. Two distinguished Harveian orators, the late Dr. J. A. Ormerod and Sir Bryan Donkin, have dealt with the subject of heredity in relation respectively to nervous diseases and criminology, based upon wide experience, but neither of these has treated of the relation of heredity to insanity based upon the study of pedigrees, statistical data, and pathological findings.

MENTAL DISEASE WITHOUT EXOGENOUS CAUSE.

There are three conditions which prove my argument that there are certain types of mental disease in which the naked-eye appearances of the brain do not afford any indication of an exogenous cause of the disorder and loss of mind presented by the symptoms during life. They are termed respectively dementia præcox, manic-depressive insanity, and involutional melancholia, of which the two latter may terminate in dementia. Through the study of a large number of carefully constructed pedigrees by myself and co-workers, extending in many instances to four or five generations, and of statistics based on a card system extending to 4000 related individuals who have been or were at the time in one of the ten London County asylums, I have come to the conclusion that there is a signal tendency to *antedating* in respect to these types of insanity. That is to say, if a parent suffered with manic-depressive insanity, or a parent or grandparent with involutional melancholia or senile dementia, one or more of the descendants may suffer during adolescence with dementia præcox. In the construction of pedigrees I was particularly struck by the fact that two, three, or even four or five members of the same co-fraternity at about the same age suffered with mental disease—usually dementia præcox; sometimes with manic-depressive insanity; not infrequently with dementia præcox *and* imbecility. This is a more striking proof of hereditary transmission than when a mental disease is transmitted in successive generations.

When there is evidence of insanity or epilepsy in both stocks, or a general neuropathic tendency indicative of mental instability, the liability to dementia præcox is greatly increased in the descendants; therefore in advising (as one often has to do) in regard to marriage, evidence pointing to these special forms of mental disease in both stocks, on one side, still more on both sides even if shown in collaterals, induces one to say definitely from a eugenic point of view that it would be inadvisable—inasmuch as the risk of an insane inheritance for the children is so much the greater. Moreover, in some of the pedigrees it looked as if there were segregation of unit characters, for I was able to find healthy children who married and had a healthy grown-up progeny in the same co-fraternity with cases of dementia præcox and imbecility. But, as the late Dr. Ormerod and Sir Bryan Donkin pointed out in their interesting Harveian Orations, there are too many complicating factors to permit of Mendelian principles, which are so striking in animals where breeding can be controlled, specially in relation to mental diseases. I have to omit here the statistical data, but I should like to refer to one result of them, because it supports my premiss. Prior to the war the number of cases of dementia præcox admitted to asylums was about equal in the two sexes, likewise the average age incidence (about 23 years). During the war there were half as many male admissions of dementia præcox as females whose parents were or had been in the London county asylums. The age of these males averaged 17·5 instead of 23·5; the reason being that those over the age had been conscripted, and I may state that 14 per cent. of the insane in the Army were cases diagnosed as dementia præcox.

DEMENTIA PRÆCOX A VITAL DEFECT.

By a comparison of the mental and bodily conditions of an acquired mental disease—general paralysis of the insane—with the mental and bodily conditions found in dementia præcox, I shall endeavour to show that dementia præcox is a vital defect of the reproductive organs, and of the brain in particular, and probably of the whole body.

Spermatogenesis.—I have investigated spermatogenesis in 108 cases dying in hospitals and asylums at different ages and in different bodily states, including normal death from shock of injury. I have found it active from puberty to old age (81) with individual variations in degree. In cases where severe chronic disease occurred in early life there has been found absence or deficiency of spermatogenesis. In adults dead of shock following accident, tuberculosis, dysentery, broncho-pneumonia, enteric fever, gangrene of lung, active spermatogenesis was found. It was absent in several cases of prolonged extensive suppuration and in several cases of cancer. But these were diseases in which an active prolonged cell proliferation had taken place.

In general paralysis local patches of atrophy of the testes with dense fibrosis occurred in many of the cases examined, but with very few exceptions, in a large number of cases, active spermatogenesis in all stages was found in spite of intercurrent disease. The atrophied patches were due either to gonorrhœal epididymitis or localised syphilitic inflammatory affection of the testes. The dense white fibrous patches microscopically examined exhibited tubules consisting of thickened basement membrane without Sertoli cells or spermatogenic cells of any kind. The atrophic process was due to a regressive atrophy, as in dementia præcox. This, moreover, was shown to be the case by the fact that normal tubules with active spermatogenesis and Leydig cells could be found in the midst of the atrophied tubules. In spite of this secondary atrophy which affects the testes of many paralytics, the average weight of the pair after removal of the epididymis and tunica vaginalis is 8 grammes heavier than the testes of dementia præcox; whereas in the majority of cases of dementia præcox examined an emulsion of the testes revealed no spermatozoa, the converse was found in paralytic dementia.

In 27 cases of dementia præcox of which the testes were examined, either a commencing, a partial, or a complete primary regressive atrophy was evident by the morphological and micro-chemical changes in the spermatogenic epithelial cells and the interstitial cells, with a corresponding thickening of basement membranes and overgrowth of interstitial connective tissue. With a few exceptions these testes of dementia præcox cases showed less evidence of active spermatogenesis than the testes of an old senile case aged 81 at death. In 27 per cent. of the cases the interstitial cells showed the pigmentary degeneration found in old age.

Circulating Toxins.—I have no time to deal with the very important question of the influence upon the germ-plasm of circulating toxins in the blood. But the study of the testes of 100 cases dying of all forms of disease, and yet, except in dementia præcox and imbecility, showing with very few exceptions active spermatogenesis, appears to me to find a solution in the fact that a barrier of lipoid granules, similar in chemical composition to the lipoid granules in the cortex adrenalis, was found. These granules consist of a lecithin-cholesterin ester. The cholesterin acts as an antitoxin. Now I found in cases of microbial toxæmia that the lipoid-cholesterin ester disappears from the cortex adrenalis, and some people speak of this gland as antitoxic in function on this account. It seems to prove that Nature will provide as long as it can for the protection of the germ-plasm. There is evidence to show that these lipoid granules are connected with oxidation processes, and would therefore protect the germ-cells against poisons like alcohol circulating in the blood. Whereas in general paralysis clumps of eosin-stained cells could be seen in sections of the testes with a low-power magnification, in the great majority of cases of dementia præcox eosin-stained clumps were not visible; the appearances suggest a failure of these interstitial cells to maturate. Fibroblasts and dense fibrous tissue tend to replace the Leydig cells. It is less easy to show the regressive atrophy in the ovaries for various technical reasons, but the study of 100 patients dying in hospitals and asylums led me to the conclusion that there is, similarly to the male reproductive organ, a tendency to regressive atrophy of the reproductive organs in the female in dementia præcox, as evidenced by the deficiency of the chromatin in the nucleus of the primordial follicles, their disappearance and replacement by fibroblasts. The organ shows a sclerotic condition even in many young women suffering with this disease.

A CASE OF ACUTE DEMENTIA PRÆCOX DESCRIBED.

To the first volume of "Libro en Honor" of Ramon y Cajal I contributed a paper upon the Genetic Origin of Dementia Præcox, giving the clinical history and pathological findings in the brain and reproductive organs of a case of acute dementia præcox. The following is a summary:—

There was a family history of insanity on both sides. A brother died in Charing Cross Hospital from a self-inflicted bullet wound of the brain. The testes were sent to me in 1916, as I had asked for the testes of cases dying of injury; pronounced regressive atrophy was found. I put them aside, after finding they were very abnormal, and forgot all about them. Five years later I was asked to see a case at Claybury Asylum of acute adolescent insanity, and I was struck by the patient's name and by the history of the brother having died from a self-inflicted bullet wound. I then recollected the name and recognised that it was that of the brother who had died in Charing Cross Hospital. There was a history of a sister who had been admitted four times to an asylum with manic-depressive insanity with sexual delusions; a brother and sister were normal; all the five were highly intelligent. The blood and cerebro-spinal fluid examined during life were both sterile; and there was only slight leucocytosis. The patient died 11 days after admission. The duration of the mental symptoms was about two months; they were characterised by depression, suicidal tendency, and delusions of persecution. He died of heart failure with cerebral congestion and œdema. The testes, freed from tunica vaginalis and epididymis, weighed only 8 g. each, which is less than half the normal weight. They presented a uniformly grey instead of a white appearance, quite like the organ in advanced cases of dementia præcox. The microscopic appearances of regressive atrophy were in all respects a counterpart of those I had found in the testes of the brother. Sections of the testis revealed tubules in all stages of primary regressive atrophy. Some of the tubules showed only a thickened basement membrane lined by Sertoli cells without any spermatogonia or spermatocytes; in others there were all stages of regressive degenerative atrophy of the spermatogenic epithelium, shown by a diminution or even absence of nuclear chromatin in spermatogonia, spermatocytes, and spermatids. Where spermatids or spermatozoa were seen there was evidence of a micro-chemical or morphological change similar to the condition I have found and described in other early cases of dementia præcox. The interstitial tissue displayed an overgrowth of fibroblasts, the cells of Leydig were diminished in size and numbers, the nuclei of the cells were deficient in chromatin, smaller than normal, irregular in shape instead of round, the cytoplasm was deficient in eosin-staining substance, and the appearance of the cells generally was that of a regressive atrophy. Pronounced nuclear and cytological changes were found in the cortical neurons generally, but the small stellate cells of Cajal were particularly affected.

The microchemical and morphological changes of the nuclear material of the cortical neurons and of the testis in this case indicate an hereditary biochemical deficiency of nuclear material in two structures essential for the preservation of the individual and the species. It has been asserted that the nuclear changes in the reproductive organs and the cortex of the brain in this disease are due to tuberculosis. In neither of these two young men was there any evidence of tuberculosis, but a strong family history of mental disease on both paternal and maternal sides.

CORRELATION OF DEMENTIA WITH PHYSICAL CHANGES.

In general paralysis the degree of dementia can be correlated with the degree of decay and degeneration of the cortex caused by the spirochætal infection and the escape of toxins into the cerebro-spinal fluid. There is a proportional extent of chronic inflammatory change, thickening and adhesion of membranes, and atrophy of the convolutions, obvious to the naked eye and sufficient to account for the loss of mind. The parallelism is shown in the fact that if there is well-marked speech defect the left hemisphere will weigh usually 20 to 40 g. less than the right. Chance is everything, hereditary disposition nothing, in this disease. There is chance of the individual being infected, but only 5 per cent. of those infected owing to colonisation of the spirochæte in the brain suffer from general paralysis. Likewise chance is everything in the juvenile form due to congenital syphilis.

In dementia præcox the macroscopic appearance of the brain exhibits nothing abnormal, and even microscopic examination shows little. How can the mental symptoms, then, be correlated with the microscopic changes found in the cortex? Before considering this matter more fully let me state what are the fundamental symptoms of dementia præcox: they are a weakening of judgment, of attention, of mental activity, of creative ability; the dulling of emotional interest; loss of energy; and, lastly, the loosening of the inner unity of psychic life. The biological view I take is that there is an inherent defect in the fertilised ovum, which shows itself in later life in two structures connected with the primal instincts of self-preservation and preservation of the species, and in those very structures where active nuclear formative processes take place—namely, the cortex cerebri and the reproductive organs. The brain does not waste in dementia præcox because the axon remains alive and the white matter surrounding the axon does not degenerate. Now the grey matter of the cortex, where all the essential chemico-physical processes take place, according to Donaldson, does not amount to more than one-fiftieth part of the white matter of the cerebrum. Yet if there is functional or structural synaptic dissociation there will result a corresponding failure of psycho-physiological processes and disintegration of the psychic unity according to the nature and degree of dissociation. Accordingly, to the naked eye, the brain may appear normal, and even microscopic investigation may not disclose in many cases (where the mental symptoms are mainly due to suspension of function) histological changes sufficient to account for the symptoms, as in manic-depressive insanity, where the patient returns to normal mentality.

GENETIC INADEQUACY.

How can we explain the dissociation (schizophrenia) from a physiogenic point of view? I should say by genetic inadequacy—namely, an inherent defect of the vita propria of the neurons, especially of those developed from the telencephalon. This portion of the neural tube is the latest to develop phylogenetically and ontogenetically. The countless millions and millions of neurons which constitute the cortex of the cerebral hemispheres have developed from relatively a very small portion of the original neural blastema. At birth further neuronic formation ceases, and further formative activity consists only in growth and extension of nerve-cell processes. This continues until at 2½ years the brain has attained a size nearly two-thirds of that of the adult. After this growth proceeds slowly until adolescence. There may be a varying amount of prenatal complete arrest of neuronic development, affecting especially those neurons of the highest level which are of evolutionary latest development—namely, the supragranular layer of pyramids—and various grades of amentia may be the result. There may be various degrees of partial arrest of growth and extension of the dendrons, by which there is only incomplete synaptic junction of many neurons of the highest evolutional level. Such a condition may lead to a failure in the highest level of control without much morphological evidence of a mental defect.

Lastly, there may be an inherent lack of durability of the neurons by which they are incapable of performing their functions of storage and transformation of energy during the life of the individual. In normal physiological conditions the neurons should be capable of functioning as long as the whole organism lives. Through an inherent defect they are apt to fail to function at the critical periods of life—namely, adolescence, the climacterium, and senescence; physiological conditions of stress—gestation, parturition, and lactation—may occur in the female. Again, such causes of psychological stress as emotional shock, repression and frustration of the sex instinct, causing endocrine disturbance and insomnia, are exciting causes of the onset of disordered functions of the highest level of neurons. If a deficiency of thyroid secretion can arrest structure, and thereby function, producing cretinous idiocy, it is not surprising that a deficiency of thyroxin in the blood should cause slowing of nervous function when the growth of the neurons is completed. But the thyroid gland's function is correlated with the whole reproductive endocrine system.

A noticeable histological feature in the brains I have examined of cases of dementia præcox is a morbid change in the nucleus. This change was first described by Nissl as occurring in the cortical cells. It was later described by Alzheimer and by most investigators since. It shows a swelling with often irregular infolding of the nuclear membrane, and deficiency or absence of the basophil staining of the intranuclear network by Nissl stain. In the light of recent researches on the chromosomes in relation to heredity this defect of nuclear chromatin, which occurs also in the reproductive organs, suggests a primary genetic defect. Now the nucleus of the neuron plays undoubtedly an important part in the function of transformation and discharge of energy from the cell. Although the Nissl granules are artefacts and do not exist in the living cell, yet their presence in the body of the cell and dendrons, and the microchemical reaction they give—showing that they contain phosphorus and iron—indicate that in the living neuron there is a continuous interaction between the surface of the granules and the nucleus by the mediation of the cytoplasm.

There is evidence that the granules which are contained in the body of the living neuron and its dendrons, but not in the axon, may form an oxygen surface, and that the iron of the nucleus may act as a catalase; now if there is a nuclear failure, as histological observations show, this may account for the neurons being unable to transform and discharge energy along the axon. The neuron is still able to live and its axon is not wasting, therefore the brain does not waste. How, then, can we associate this evidence pointing to a defect in the specific functions of the evolutionally latest and highest developed level of the brain with the philosophical teaching of Hughlings Jackson? The latter, in his discourse on the Factors of Insanity, points out that positive symptoms such as illusions, hallucinations, and delusions, which are so frequently met with in this disease, are evidence of functional activity brought into relief by the negative condition of the highest evolutional level.

What, then, is the original cause of this abnormal variation in the inborn vis propria of the fertilised ovum? It has been suggested that syphilitic antecedents may be the cause of dementia præcox, but I have been unable to find proof of this after examination of the cerebro-spinal fluid of a large number of cases of dementia præcox. It is a fact that these diseases do occur in primitive peoples, only the symptoms, such as hallucinations and delusions, are coloured by social usages, customs, and beliefs.

TENDENCIES INBORN AND ACQUIRED.

Lastly, from a practical consideration of the subject of insanity, it is very necessary to recognise that the germ-cells of every person who is certified as insane and sent to a mental hospital are not necessarily possible potential transmitters of a mental disease. General paralysis of the insane and many other microbial infections leading to disordered mental functions are acquired diseases and are not hereditary. Neither is it right to assume that simple senile decay affecting the brain is transmissible, yet a large percentage of inmates of asylums are sent there on account of senility. These legal administrative conceptions of mental disease must therefore vitiate all statistics in respect to heredity as a cause of mental diseases, because based upon data in which admissions to a mental hospital are in many instances the sole evidence.

This does not apply to the same extent to carefully recorded pedigrees; but even these are not free from error, for often all the information that can be obtained is that one or more members of the stock had been in an asylum. How is the public to know the difference between an inborn tendency to insanity *ab initio* in the ovum, true heredity, and a condition which may arise after conjugation of the male and female germs while the developing embryo is still in the body of the mother? As Sir Bryan Donkin pointed out, congenital disease was confounded with hereditary disease even by medical witnesses who gave evidence before the Royal Commission on Feeble-mindedness. The term "hereditary syphilis" is a misnomer. Much may happen while the embryo is still in utero. The normal biological processes of nutrition of the developing embryo may fail; abnormal mechanical conditions may arise in the uterus, interfering with the proper development of the embryo; or mechanical conditions in the process of development of the embryo may arise, interfering with the development of structure. Of all the structures in the body of the embryo likely to be affected by a departure from normal dynamic biological conditions of growth, the great brain or cerebrum is the most likely. The neo-encephalon—new brain—of mammals appears first as two hollow buds from the telencephalon, which by rapid cellular proliferation grow upwards and backwards to cover up completely the basal ganglia and mid-brain to form the cerebral hemispheres. In that process many mechanical failures and accidents may occur, interfering with the vascular supply or nutrition of the rapidly proliferating cells, whereby the process may be arrested altogether, as in anencephaly, or partially arrested, as in the brain of the idiot or low-grade imbecile.

There is evidence of a possible vascular cause through a lack of correspondence in the normal rate

of growth of the dura mater and soft membranes and the growth of the brain. Owing to this the veins enter the longitudinal sinus in a direction opposite to the current of the blood-stream in the frontal lobes—an anatomical condition which favours venous stasis. This I have put forward as an explanation of the fact that the frontal lobes are the seat of early and most pronounced meningo-encephalitis and atrophy in paralytic dementia, because the spirochætes, being anaerobic, would develop more easily where there is venous stasis. Again, prolonged labour and difficulties in delivery requiring the use of instruments may be responsible for injury of the brain. Idiots and imbeciles occur in all grades of society (frequently they are the first-born), and it is not at all uncommon to find nothing in the paternal or maternal family history—even when a pedigree can be obtained of three or four generations—to account for this pronounced failure of development of the anatomical basis of mind. The late Dr. Henry Ashby considered that 25 per cent. of the cases of idiocy and imbecility were due to other causes than heredity.

Cameron Lectures

Delivered at the University of Edinburgh on Oct. 19th, Oct. 20th, and Oct. 22nd, 1925.

BY HARVEY CUSHING, C.B., F.R.C.S. ENG.,
PROFESSOR OF SURGERY IN HARVARD UNIVERSITY.

LECTURE I.*—THE THIRD CIRCULATION AND ITS CHANNELS.

> "Cet enfant a de l'eau dans la tête, dit le vulgaire; cet enfant est hydrocéphale, dit gravement le médecin, répétant littéralement par un mot grec ce que dit l'ignorant dans sa propre langue. Mais quelle est cette eau? d'où vient elle? Voilà ce dont les médecins auraient dû s'occuper."—*François Magendie, 1842.*

As a tribute to the memory of François Magendie, I propose to devote the first of these lectures to the subject of the cerebro-spinal fluid, for just 100 years have passed since the appearance of the earliest of his epoch-making publications in which attention was drawn to the physiological importance of the peculiar watery medium which bathes the central nervous system.

Something of the state of our knowledge before Magendie's time may be gathered from a paper (1768) on Dropsy in the Brain by the celebrated Robert Whytt, one-time professor of medicine in this university, wherein is given the first recognisable description of what must certainly be tuberculous meningitis.

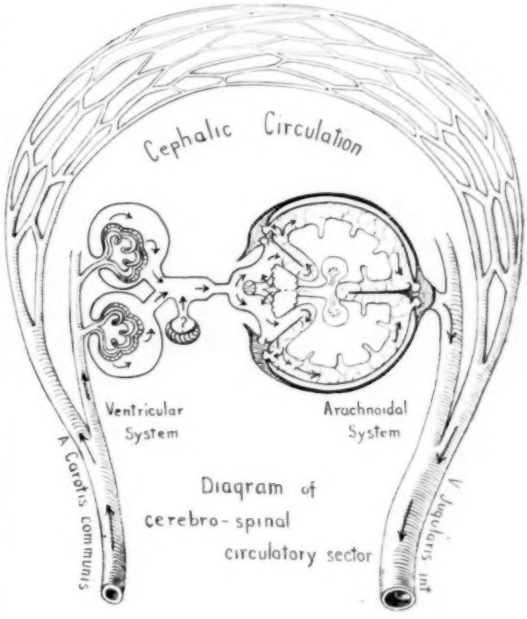
> "The immediate cause of this disease," he says, "and indeed of every kind of dropsy, is always the same—viz., such a state of the parts as makes the exhalant arteries throw out a greater quantity of fluids than the absorbent veins can take up."

But Whytt, though a man ahead of his time, could have had no possible conception that the cerebro-spinal liquor was a specialised medium with a peculiar circulation of its own. And as my chosen title indicates, it is this particular feature of the fluid—namely, its circulating character—that I wish to emphasise, and I shall have less to say about its biochemical and cytological characteristics in health and disease, so thoroughly studied by many, than about the channels through which it percolates.

THE FLUID AND ITS CONFINES.

On Movement in a Circle.—It is quite evident that Magendie, who believed the fluid was secreted by the pia, much, for example, as pericardial fluid is secreted, had no idea of its movement as other than an ebb and flow. And this truly Galenic conception of a cerebro-spinal fluid circulation still holds in most modern text-books of physiology, even though Key and Retzius gave a hint of the actual state of affairs by demonstrating the continuity of the fluid-holding leptomeninges as distinct from the subdural space, and by suggesting (without satisfactory proofs, to be sure) that the granulations of Pacchioni represent portals through which the fluid passes from the arachnoidea into the large meningeal sinuses. . . .

FIG 1.



On the whole, it would appear medical students get little information about the fluid as a circulating medium in their course in physiology, and what they get is mostly wrong.

This curious neglect of a vascular system which teems with biophysical problems can only be explained on the grounds that the subject of intracranial dynamics is one of the few on which Carl Ludwig, the father of modern physiology, did not focus his fertile mind, and his pupils unto the third generation have followed suit. . . .

That the arterial and venous blood has "a motion as it were in a circle," in contradistinction to the Galenic idea of an ebb and flow, was the conception, when put to proof, by which the immortal Harvey transformed medicine. For even though the idea, from the heart around and back to the heart, was not entirely new, at least so far as the lesser pulmonary circulation is concerned, it was a view against all authority, and in the case of Servetus was burned with its author at the stake.

But the existence of another fluid besides blood which "circulated" was soon suggested by Aselli's discovery of the lacteals, and Picquet's of the thoracic duct; and finally William Hunter, or was it again your Monro secundus, who first postulated that the lymphatics represented a system of absorbent vessels which were supposed to conduct the watery constituents of the tissues? To be sure, the movement of the chyle and lymph, under this conception, is not actually in a circle in a strictly Harveian sense, but rather in what one might describe as across a sector of the blood circle. And the same is true of the cerebro-spinal fluid which proves to be in continual movement, in a definite direction, through a highly specialised pathway, that cuts across the blood circle to envelop an organ in which a lymphatic apparatus of the usual type does not exist (Fig. 1).

* Lectures II. and III. will appear in subsequent issues of THE LANCET. They are slightly abridged for issue in our columns, and will be published shortly as a small volume, dedicated to a group of young collaborators.—ED. L.

In Explanation of Hydrocephalus.—Though these matters which concern the brain en masse may have failed to intrigue the attention of physiologists, they have been, if anything, of even greater interest and concern to the neurosurgeon than the localisation of function, since the success or failure of many of his undertakings depends more upon his familiarity with the fluid circulation and its possibilities as a complicating factor in his procedures than upon any other one thing. For the fluid, indeed, may prove his most stubborn enemy or his most valued ally. . . .

My own interest in the dynamics of the intracranial chamber was first aroused while engaged 25 years ago in the Hallerianum in Berne on a problem suggested by the late Theodor Kocher, who was preparing a monograph on cerebral compression for Nothnagel's "Specielle Pathologie" (1901), wherein he laid far more stress on the results of my researches during that happy year than they perhaps deserved.

On my return to Baltimore, with the intention of specialising in the surgery of the nervous system, among the first of my patients—as will probably have been true of most young men entering this particular field—were infants with what is known as essential hydrocephalus, for which a greater number of treatments have as yet been advocated than successes recorded; indeed, if there are any clear-cut successes recorded. I had only the vaguest possible ideas of the cerebro-spinal pathways; and if Leonard Hill's statement, made in the course of his admirable Hunterian lectures in 1896 were true—"That no pathological increase of cerebral tension can be transmitted to the cerebro-spinal fluid, because the fluid can never be retained in the meningeal spaces at a tension higher than the cerebral veins"—I could not understand how it was that a fluid which acted chiefly as a water-bed for the brain could give surgeons so much trouble, and so determined to find out something more about it if that were possible.

One of my early co-workers in the Hunterian Laboratory in Baltimore, Dr. Lewis L. Reford, undertook to study the development of the leptomeninges by injecting India ink under light pressure into the spinal canal and into the spinal subarachnoid spaces of living pig embryos of various ages. After the tissues had been "cleared" so that the course of the injection-mass could be observed, it was found that in the younger embryos fluid introduced into the canal passed headwards into the ventricles from which there was no escape; that later on, whether injected into the canal or into the subarachnoid space, the mass would spread from the region of the fourth ventricle around the base of the brain; and, finally, that in older pigs it would extend up over the hemispheres in what appeared to be developing meningeal spaces which had no connexion with the extracranial lymphatics. . . .

With this small beginning, and without any definite sequence, a variety of studies were undertaken during the next few years, which were merely along by-paths to the actual goal we continued to bear in mind—namely, furtherance of our knowledge of the mechanism of hydrocephalus, of which there probably were many kinds. Numerous examples of this most distressing condition in infants had meanwhile come under observation in the clinic, and it was found that in most of them the fluid could be withdrawn from the ventricles by lumbar puncture. Moreover, when a needle attached to a manometer was inserted through the bulging fontanelle into the ventricle and another in the lumbar sac, the pressure level of the fluids in both usually remained the same and fluctuated equally with crying, straining, or jugular pressure, as well as on the withdrawal of fluid from either end of the system. At the same time we observed, as many others doubtless have done, that even though large amounts of fluid might be withdrawn—as much as a completely collapsed fontanelle would permit, and amounting at times to over 300 c.cm.—within 24 hours the fluid would have reaccumulated, albeit with slightly altered chemical and cellular characteristics, and perhaps with slightly increased tension.

From these simple clinical tests I became convinced that some fault of development in the portals of outflow for the fluid from the meningeal spaces, or their occlusion by disease, was more likely to be the cause of hydrocephalus in infants than either an acquired obstruction to the passage of fluid from ventricles to the subarachnoid spaces, or a "block" somewhere in the course of these mesh-like though abundant channels. . . .

As we knew nothing at this time about the portals of drainage other than that Key and Retzius had associated them in some way with the Pacchionian bodies, structures not demonstrable in infants, and being then under the impression that some of the fluid, as maintained by many, normally escapes into the extracranial and extraspinal lymphatics which might therefore be utilised as pathways for absorption, the attempt was made to drain the subarachnoid lumbar fluid directly into the retroperitoneal tissues through a trephine opening in the body of the fifth lumbar vertebra. It was thought that this loose tissue in direct proximity to the thoracic duct would be a medium more favourable for permanent drainage than the subaponeurotic layer of the scalp which had been previously utilised for the purpose with disappointing results. . . .

Baffled in this, which proved to be a futile procedure, and believing that somehow or other in curing hydrocephalus the fluid must be allowed to get directly into the venous circulation, attempts were made to accomplish this by Dr. R. D. McClure who, as an improvement on the method of Payr, essayed to transplant a vein between the subdural space and a vessel in the neck; and by myself, with the placement of a specially devised silver tube which led from the dilated third ventricle through the corpus callosum directly into the longitudinal sinus. As in most other surgical experiences with "essential" hydrocephalus the results were inconclusive, but the observations at least taught us that no blood subsequently passed from the sinus into the ventricle, which was regarded as an indication that the tension of the fluid must at all times be greater than that in the veins.

Filling Gaps in our Knowledge.—These early endeavours all tended to show how imperfect was our knowledge of the source or sources of fluid supply, and of the method whereby it was absorbed. In other words, too much attention had been paid to the bath itself and too little to the tap, to the construction of the tub as a container of the bath, and to the place and mechanism of its outlet. Accordingly, on my transfer to Boston in 1912, Dr. Lewis H. Weed and I set ourselves to these problems, and the following questions for which we needed answers were gradually formulated.

Granting that the choroid plexuses are the chief source of the cerebro-spinal fluid—and this has not been conclusively proved—is the process, as some believe, a transsudation, or a secretion, or as Mestrezat regards it, a mere dialyzation from the blood? What conditions activate and what conditions inhibit these choroidal glands? Have they an internal as well as an external secretion? To what primary diseases are they subject? How early in embryonal life do they secrete? Why does the fluid which they elaborate differ so greatly from that secreted by most other glands? Why are the cells so impermeable to the passage from the blood-stream of drugs and of substances such as the bile pigments, which in conditions of jaundice quickly stain all other body tissues and fluids.

Granting that the fluid thus secreted by the choroid plexuses leave the ventricles and spreads over the brain and down the cord in the subarachnoid spaces, does it receive accessions from elsewhere, from the ependyma or from pituitary or pineal glands? Are there lymph channels in the brain, and if not, how does the central nervous system dispose of its products of tissue waste? If there are [anything comparable to] cerebral lymphatics do they discharge into the subarachnoid spaces, and is the subarachnoid fluid therefore of the same character chemically, physically, and

cytologically as the ventricular fluid? Why normally is the fluid practically limited to the subarachnoid spaces, and under what conditions does it become subdural?

Granting that fluid may escape by way of the Pacchionian granulations, is this the chief or only manner of escape? If an important avenue, why are these structures lacking in the lower animals and in the human infant? Are these granulations, therefore, pathological processes, and, if so, what are their precursors? Are there other means of fluid absorption along the nerves by way of the lymphatics, and, if so, how important are they? How do the spaces in the pia-arachnoid develop, and do the choroidal glands mature and secrete before or after their formation? Are there faults of development at these meningeal outlets for fluid which can account for congenital hydrocephalus and for malformations such as spina bifida and cephalocele? Are there analogies in the fluid circulation of the eye to which we may attribute the disturbances of circulation of the intra-ocular fluids?

It so happened that we came to attack these questions in reverse order, "upstream" as it were; and instead of beginning with the plexus, though this was not wholly neglected, attention was first paid to the portals of exit. Dr. Weed soon hit upon a satisfactory method of identifying these structures, which was free from the objections raised against those employed by his predecessors. This consisted of a long-continued subarachnoid injection in the living animal, of potassium ferrocyanide and iron ammonium citrate in isotonic solution, under a pressure but slightly above the normal, with the subsequent immediate fixation of the tissues in an acid medium. This procedure, which served to precipitate Prussian-blue granules out of the foreign salts introduced in solution, made it possible to utilise histological methods to identify the situation of the granules in the tissues and tissue spaces.

To shorten a long story, it was found that the fluid had passed through the mesothelial cells which cap the arachnoid villi that project in large numbers through the dura into its many venous sinuses, large and small, in all parts of the cranial chamber. This, broadly speaking, was confirmatory of the view of Key and Retzius, but it substituted these innumerable and widely disposed microscopic structures for the Pacchionian granulations to which they had ascribed the function of drainage, and which merely represent pathological enlargements of some few of the villi. . . . With this substitution of countless microscopic arachnoidal villi for the occasional Pacchionian granulation as the essential portals of escape for the fluid, our conception of the process of absorption was greatly clarified; and Weed's subsequent demonstration of the ease and certainty with which a chronic hydrocephalus of high grade may be experimentally produced by the simple injection into the subarachnoid channels of lamp-black, which serves to occlude the arachnoid villi, would seem to make it most probable that damage or imperfect development of these structures is the most common cause of otherwise unexplained cases of early or congenital hydrocephalus.

The Perivascular Channels.—But to return to the views of others in regard to the process of absorption. In a study of the brains of animals subjected to experimental anæmia, Frederick W. Mott had observed that the perivascular "lymphatics" of Robin (better known to pathologists as the Virchow-Robin spaces), which represent prolongations of the leptomeninges around the vessels that dip into the brain substance, were particularly well shown (Fig. 2). These observations led him to conclude that absorption of the fluid from the subarachnoid spaces normally took place by way of these "lymph" channels with the natural corollary that the cerebral capillaries represented the chief absorbent vessels. This same view, if I read him aright, came to be held by E. F. Goldmann and is set forth in his classical monograph (1913) on vital staining of the central nervous system.

It may be assumed that both pathologist and anatomist are talking of the same thing when the one mentions the perivascular spaces of Virchow and of Robin, and the other the space of His. However, all three of these distinguished investigators originally gave such casual descriptions of the spaces in question that it is surprising that they should have become eponymic. . . . One might naturally suppose, since the superficial vessels of the brain and cord lie within the subarachnoid space, that they would carry down with them only a sleeve of pia, but as a matter of fact the so-called pial vessels of the surface, like the trabeculæ within the subarachnoid spaces,

FIG. 2.

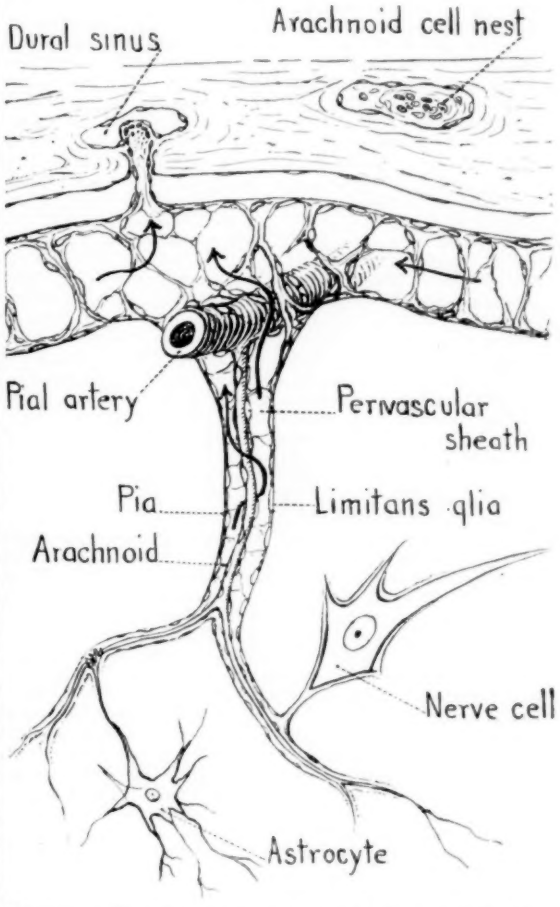


Diagram to show the sleeve of pia-arachnoid constituting the perivascular space surrounding a branch of a pial artery (modified from Weed).

are, as Weed has clearly shown, covered by an endothelial lining. Hence, the perivascular sleeve is necessarily a double one, and there can be no question but that the space enclosed, whatever its function, lies in direct communication with the subarachnoid spaces; nor can there be any doubt as to its having a "visceral" (vascular) lining of arachnoid and a "parietal" (nervous) lining of pia rather than that, as generally conceived, it is formed by a sleeve of the pia alone which lies adjacent to the limitans glia.

But to return to our personal story. Under the condition of Weed's earliest experiments, no deposit of Prussian-blue granules was found in these perivascular spaces unless the animal were bled during the course of the injection. However, our interpretation of these facts was contrary to Mott's, for to us it seemed more probable that the normal flow in these channels should be from the brain towards the subarachnoid spaces rather than the reverse as

he had assumed; and it was even then beginning to be known that these perivascular spaces become packed with cells in many disorders affecting the brain, which accounts for the early pleocytosis in the fluid.

Light on the Monro-Kellie Doctrine.—In further explanation of the direction of flow in these perivascular spaces, we must revert to the doctrine first formulated by your Monro secundus, but properly known as the Monro-Kellie doctrine, since it was further elaborated some years later by another Scotsman, Dr. George Kellie, of Leith. According to this doctrine, which introduces certain principles of physics relative to the flow of fluids through an incompressible retainer, the contents of the intracranial chamber with its three elements, nervous tissue, blood, and fluid, must always remain the same in bulk. Any increase in blood volume, for example, can only take place at the expense of one of the other elements, and conversely a diminished blood volume must be compensated either by an expansion of the brain or by an increase of cerebro-spinal fluid which probably amounts to the same thing. Hence, if an animal is bled and the brain in consequence shrinks in size, it becomes, as Weed termed it, a "thirsty brain," and the additional fluid which must necessarily be provided to compensate for the shrinking becomes sucked down into the perivascular channels.

Moreover, since these changes all take place rapidly—a matter of minutes—it is hardly possible that the great increase of fluid which the process entails could be the result of mere transudation. George Kellie was close to the facts a century ago when he said, in speaking of the effect of cerebral anæmia, that "watery effusion within the head is a pretty constant concomitant or consequence of great sanguineous depletion."

All this is part and parcel of the extraordinary phenomenon of cerebral œdema, for the brain, owing to its sponge-like structure, is apparently more capable than any other of the body tissues of taking up fluids with an enormous and rapid increase in its bulk; and it was, perhaps, through some such sequence of ideas that Dr. Weed, with his own pupils in turn, a few years later, while in charge of an experimental laboratory during the war, made the discovery that prompt changes in brain volume ensue upon the intravenous injection of hypertonic and hypotonic fluids. This discovery not only has served to provide a new method of attack on many old problems associated with the Monro-Kellie doctrine, but it has proved in the clinic to be a veritable boon for certain desperate states.

The practical applications of the discovery were obvious, and they were immediately pounced upon for therapeutic purposes. In the first place, it was apparent to the physician that drugs like salvarsan, to which the choroid plexus was impervious, might be brought more intimately in contact with the nervous tissues owing to the probable reversal of the current in the perivascular channels when the brain was shrunk by hypertonic solutions. The surgeon, on the other hand, promptly adopted the procedure as a means of lowering intracranial tension; and it is truly amazing how rapidly certain patients in deep stupor, even with Cheyne-Stokes respiration, may be brought back to consciousness after the intravenous administration of a hypertonic solution. . . .

Development of the Arachnoidea.—But I am getting far ahead of my story. Having proved to our satisfaction how it was that the fluid became absorbed, Dr. Weed on his return to Baltimore proceeded, as I have expressed it, to work "upstream," and ere long completed his extensive and now classical monograph on the development of the meningeal spaces. These spaces, as he convincingly demonstrated, are produced by a seepage through the roof of the fourth ventricle of fluid which permeates and breaks down the perimedullary mesenchymal syncytium. This occurrence practically coincides, as we had anticipated, with the development of the choroidal tufts, and supposedly therefore with the initial flow of cerebro-spinal fluid which comes to supplement the stagnant pre-existing fluid, for the undifferentiated cells of the ependyma up to this time may be assumed to have a secretory activity of some sort.

These illuminating studies of Dr. Weed's not only confirmed but greatly amplified the observations made by Reford ten years before. They serve to show with some finality: that at about the fifth week of embryonic life fluid begins to percolate through the remaining fragment of the roof plate overlying the fourth ventricle; that it finds its way through leptomeningeal channels which are thereby formed in the mesenchyme; and finally, that it escapes by way of persisting leptomeningeal communications, the villi, that project through the dura into its major venous sinuses. All of which assuredly indicates the birth of an actual circulation under the pressure of a secretion.

Meanwhile, in 1913–14 W. E. Dandy had been pursuing his ingenious studies of experimental hydrocephalus in association with Kenneth Blackfan, and though our ideas, as stated, differed from theirs in regard to the process of absorption, Dandy succeeded in making two notably crucial experiments which filled gaps in our previous knowledge. One of these was the demonstration that ventricular hydrops would occur if an inflammatory reaction were set up so as to encircle the cerebral peduncles at the level of the tentorium, which goes to show that the major course of the fluid, after its emergence from the foramina of Magendie and Luschka, is upward by way of the arachnoidea through the incisura tentorii to bathe the cerebrum.

The other of his crucial experiments relates to the actual source of the fluid concerning which, from lack of exact proof, doubts have frequently been raised. In the spring of 1911 I had had a most suggestive surgical experience with a patient[1] who had a unilateral hydrocephalus due to a cystic intraventricular tumour arising near and occluding the right foramen of Monro. After two unsuccessful efforts to give pressure relief, the ventricle, which proved to be filled with xanthrochromic clotting fluid, was opened, emptied, and the choroid plexus laid bare. From the naked plexus thus exposed, fluid could be seen to be freely exuding, but when a silver "clip" was closed on the entering choroidal artery the organ became blanched and the secretion apparently ceased. The plexus was then excised, but unhappily the patient succumbed to a subsequent attempt to remove the tumour.

In his laboratory experiments Dr. Dandy was more fortunate in his demonstration that when one foramen of Monro is occluded a unilateral hydrocephalus results, whereas if the plexus is removed coincidentally the ventricle remains collapsed. This observation could hardly leave doubt in the mind of the most sceptical that the plexus is the active spring whence the river of cerebro-spinal fluid arises, whether the actual process be one of filtration, secretion, or dialyzation. There hardly seems need of belabouring the argument further, yet Weed has recently added additional evidence by his demonstration that after the intravenous injection of hypotonic solutions, which greatly augment the amount of cerebro-spinal fluid, the choroidal cells show histological evidence of its passage into the ventricles, even though this may not be a reversible process when hypertonic solutions are injected. . . .

Hydrocephalus therefore may apparently be produced in at least three major ways: (1) by occlusion of the villi through which the fluid is normally absorbed into the sinuses (and, as a corollary, extensive sinus thrombosis, should it be compatible to life, would have the same effect); (2) by obstructions easily produced by inflammation or tumour in the narrower portions of the pathway, notably at the

[1] Johns Hopkins Hosp. Surg., No. 27733.

foramina of Monro, in the aqueduct, at the fourth ventricle, and in the narrows of the incisura tentorii; and (3) more rarely, by an increase in the amount of fluid secreted in excess of what can be cared for by the normal portals of absorption; and this is what, hypothetically, would take place could the hypotonicity of the blood, under the conditions of Weed's experiments with the injection of watery fluids, be long maintained.

In connexion with these meningeal channels there remains to be discussed another matter, the importance of which has only been stressed of late years—namely, the physiological activity of the cells which constitute the lining of the fluid pathway. Now it is a remarkable thing, if one stops to think of it, that Nature should have provided this watery fluid, which, on the general biophysical principle of diffusion, contains the salts and sugars of the blood, but practically none of its other elements. What could have been her reason for interposing in the blood-stream this peculiar circulatory switch with its choroidal barriers and impervious pia, which keeps the fluid free from practically all known substances, whether drugs or vital dyes, which may be put into the blood-stream? Unquestionably one purpose was to provide a medium for the washing out of products of metabolism—a substitute for a lymphatic apparatus if you will—for we have learned that the intraventricular and subarachnoid fluids have a slightly different chemical composition. Then, too, it seems not improbable that something may be added to the fluid in transit which may be necessary to the economy.

Vascular or lymphatic channels might well enough have served for both these purposes it would seem, and just why another medium had to be provided within spaces, which, as we shall see, are particularly intolerant of the presence of blood cells, remains unanswered. Moreover, as may be observed, there is no method whereby a collateral circulation for the cerebro-spinal fluid can be spontaneously established in cases of obstruction, and, since it passes through a very specialised pathway, it is to Nature's provisions to keep the pathway in repair and free from foreign substances which might obstruct the fluid outlets that I wish to devote the remainder of this hour.

THE CELLULAR LINING OF THE MENINGEAL PATHWAY.

The "Meningocytes" and Reparative Processes.—The mesothelial cells which line the extraventricular fluid spaces possess a most remarkable capacity for repair as must have been observed by many. I may give an example. The efforts which were made many years ago to drain the hydrocephalic ventricles by establishing a communication with the subaponeurotic layer of the scalp, in the expectation that the fluid would permanently escape into the lymphatic spaces, led to disappointments. For under these circumstances a very peculiar and striking thing happens. The scalp at first becomes widely œdematous, but in the course of a few days the œdema gradually subsides, and finally a circular pool of fluid a few centimetres in diameter is all that remains. This disc-like subaponeurotic pool, which continues in free communication with the ventricle, becomes promptly lined with a layer of glistening serosal cells, like those lining the dura, which are impervious to the further escape of fluid into the tissues.

Early in our surgical experiences with what is known as a subtemporal decompression a comparable observation was made—namely, that a new dural membrane would promptly re-form without any adhesions to the brain, provided the leptomeninges over the surface of the exposed temporal lobe were not injured in the process of opening the dura. This neo-membrane would so perfectly repair the defect over the bulging lobe that anyone who might happen after an interval to re-operate upon the patient or to conduct a post-mortem examination would be likely to doubt whether the pachymeninx had ever been opened. . . .

Practical applications have been made of this extraordinary capacity for the formation of neo-membranes. For example, there is a common intracranial tumour (meningioma), to whose source of origin reference will subsequently be made, the removal of which often necessitates not only the leaving of a defect in bone but in dura as well, so that the scalp alone covers the raw and œdematous cortical area stripped of its pia-arachnoid. The natural consequences of this would be an adherent scar between scalp and brain, with practically no re-formation of membranes, or at best of very imperfect ones, for some fluid will naturally be exuded through the intact perivascular spaces which would encourage their formation. However, should a piece of gutta percha tissue ("protective") be placed over the raw area at the close of the operation, glistening serosal surfaces will form in the manner described in a surprisingly short time, a matter of days, perhaps of hours.

Before entering into a consideration of the particular cells which take part in these reactions there is something more to be said about the processes of meningeal healing in general. Much light has been thrown on the subject by the ingenious experiments of my former assistant, Dr. S. C. Harvey, and his co-workers, who have shown the futility of patching a dural defect by the transplantation of fat or fascia as is often advocated; for if the arachnoidea over the cortex remains intact, the dura will spontaneously re-form without adhesions, whereas should the pia-arachnoid and cortex have been damaged dense adhesions will form and incorporate the dura even though its inner surface has been uninjured. In other words, as Dr. Harvey puts it, "the inner surface of the dura does not act as a limiting membrane in the presence of an attempted repair in the underlying meninges, but, on the contrary, enters intimately into the process"; and he contends that there are not only morphological but actually functional differences in the two membranes, one of which merely lines a potential subdural space, whereas the other is a more highly differentiated structure.

My own explanation of the difference in the behaviour of the two surfaces to injury would have been that the arachnoid exudes fluid, thereby providing a space which, as we have seen, becomes promptly lined by cells that migrate from the mesenchyme to make a new membrane; the dura, on the other hand, does not exude fluid, and since there is nothing to keep the surfaces apart when the pia-arachnoid has been damaged, adhesions form. But Dr. Harvey has recently brought forward additional proofs in support of his view.

He conceived the idea that the cells of the leptomeninges might be derived from the same source as the sheath cells of the peripheral nerves, which arise, as R. G. Harrison had shown, from the embryonic neural crest, whereas the dura itself merely develops from the mesenchyme. Employing Harrison's methods he removed a bit of the cerebral hemisphere of one amblystoma embryo and transplanted it into the mesenchyme in the region of the fore-limb of another, where the explant during its subsequent growth came to be surrounded by an incompletely formed dura, but with no leptomeninx. On the other hand, when a portion of the neural crest was included in the explant, a choroid plexus developed and leptomeningeal spaces were formed in addition to the duraloid-membrane of the control experiment. But here again we may have to consider the normal reactions of mesodermal tissues to the infiltration into them of cerebro-spinal fluid with the inevitable formation around the fluid spaces of a serosal membrane.

This brilliant contribution by Dr. Harvey to experimental embryology and to that much neglected part of it to which Weed had already contributed—namely, the embryology of the meninges—is extremely

interesting and important from many points of view; but as a matter of fact we may be stretching matters in the endeavour to show differences between the endothelium of the vascular and lymphatic channels and of the mesothelium of the serous cavities and cerebro-spinal fluid spaces: for they all are but part and parcel of the circulatory apparatus as a whole. But even though the cerebro-spinal fluid channels appear to be lined by supposedly fixed pavement cells, certain specialised cells are found to lie here and there in clusters, notably in association with the villi, in nests incorporated within the fibrous mesh of the dura, and in the leptomeningeal stalk of the plexus. It would seem to me that Dr. Harvey's disclosure of the difference in origin of these cells from those lining the dura—the one being ectodermal in origin, the other mesodermal—is of particular significance. Let us for a moment consider some of the duties of these particular cells, which, merely because of their situation and in complete disregard of their histogenesis, we may for convenience call *meningocytes*.

Phagocytic Properties of the Meningocyte.—If the pathway for this specially elaborated fluid is as important as we are led to assume, there would certainly have been provided some method whereby its intricate channels could be kept clear of debris, especially of blood or inflammatory products of one kind or another which might get into the stream, for otherwise these foreign particles would inevitably be swept into the microscopic villi and effectually stopper them. The experimental observations in this direction have been mentioned in discussing hydrocephalus. Moreover, it is safe to say that the head of every infant is sufficiently traumatised during parturition to cause the extravasation into the fluid of red blood corpuscles, so that from the first moment of extra-uterine life the mechanism for absorption for the fluid may be seriously interfered with.

An effective method of keeping these microscopic pathways open seems to have been provided through the phagocytic activity of the meningocytes under the stimulation of foreign particles. This property was first noted, it seems, by Quincke, who found that cinnabar granules introduced in the fluid become engulfed by large phagocytic cells—the same cells that Goldmann subsequently found to be stained by vital dyes; but more recently it has been shown by Essick in Weed's laboratory that, though this reaction might be evoked by a great variety of substances, it was particularly pronounced after the subarachnoid injection of laked blood, under the stimulus of which the cells enlarge, become vacuolated, and detach themselves from their moorings to swim out as free macrophages into the cerebro-spinal current. Thus Nature saw to this need from the first, and the surgeon has only just tardily come to a realisation that she can be considerably aided in her purpose by the prompt and repeated withdrawal of bloody cerebro-spinal fluid. . . .

The *plasma cells* of Waldeyer, the *mastzellen* of Ehrlich, the *endothelial leucocytes* of Mallory, the *pyrrol-zellen* of Goldmann, the *amœboid macrophages* of Metchnikoff and Evans, the *polyblasts* of Maximow, the *histiocytes* of Aschoff, and the *clasmatocytes* of Ranvier (the term in most common use by American authors) are probably one and the same type of cell which possesses active migratory and phagocytic properties. But in regard to their source of origin, their relation to the phagocytic monocytes, and their capacity for transformation into more fixed cellular types when they have ceased their wanderings, there are divergences of opinion.

Maximow, for example, claims that the three cell types in inflammation have a single origin in the lymphocyte; Sabin and her co-workers, on the contrary, strongly favour the absolute specificity of the several cell strains; the Lewises are convinced that the macrophages (clasmatocytes) and the epithelioid cells are merely functional stages of the monocytes, but make their position somewhat less clear in regard to the origin of the fibroblasts; whereas Carrel states he has definitely seen amœboid macrophages become transformed into fibroblasts. The final decision in these matters unquestionably lies with the experimental cytologists who have already devised and will further perfect methods of studying living cells in tissue cultures which permit direct observation, not only of their behaviour and manner of division, but also of their specific reactions to vital dyes.

What to the surgeon is of greater concern than the genesis of the active meningocyte is what it may be able to accomplish not only as a scavenger but also as a reparative agent. Certainly when it comes to the prompt replacement of a dural defect, say of 30 square cm., by a neomembrane, it is inconceivable that the pavement cells could grow in from the edges; and since it is doubtful whether these fixed pavement cells are capable of further division, we must assume either that clasmatocytes or monocytes have wandered in from the mesoderm or else that, in the guise of meningocytes, they are already present in the cerebro-spinal spaces and ready to act as reparative agents. In either case we must assume further that they are capable of ultimate transformation not only into pavement cells but also into duraloid fibroblasts.

Whether the cells which participate in these activities are cells which wander in or cells which in a resting stage are normally moored in the leptomeninges perhaps makes very little practical difference, provided one appreciates their behaviour when called into action.

Formation of Biliary Pigments.—There remains a further matter for consideration in connexion with these meningocytes. After Edwin E. Goldmann's discovery that the clusters of endothelial cells of the Kupffer cell type which lie clustered in the blood channels of various organs have a selective affinity for the vital stains of the benzidine series, the suggestion, I believe, was first clearly formulated by H. M. Evans that these cells as a group, wherever they occurred, within the blood-stream or free in the tissues, should be looked upon as an endothelial organ of major physiological importance which in his belief is concerned in the production of immune bodies. It is this organ to which Aschoff has recently drawn renewed attention as the reticulo-endothelial apparatus, one of the functions of which—and there are probably many—is the phagocytosis and disposal of broken-down blood-cells.

Little or no attention, however, seems to have been paid by those interested in this subject to the existence of a similar apparatus in the meninges, though Goldmann, whose early death was a great loss to experimental pathology, in the last of his remarkable papers clearly described the pyrrol-staining monocytes which normally reside therein. Though misled, as so many others have been, into the belief that the cerebro-spinal fluid chiefly escaped by way of the pericranial lymphatics, he observed that, whereas the central nervous system itself remains unstained by vital dyes, the choroid plexus as well as the anterior lobe of the hypophysis becomes highly coloured; and at the same time certain cells of the meninges (in places which we now recognise to be those where clusters of meningocytes particularly abound) and also occasional cells of the same type scattered through the brain take the stain faintly. He regarded it as probable that these cells played the essential rôle of phagocytosis for the locality.

Let us for a moment return to a consideration of the curious fact that this specialised endothelial apparatus of the leptomeningeal spaces appears to be called into action more effectively by the introduction of blood corpuscles than by any other foreign substance. And in this connexion attention may be drawn to the different behaviour of the pachymeningeal and leptomeningeal surfaces following the extravasation of blood into the subdural space, for as is well known the clot adheres to and begins to organise from the dural side, whereas it fails to adhere to the arachnoid. Now the subdural space, as we have seen,

has an outer and inner lining of quite different origin, and the different manner of reaction of the two surfaces to these subdural hæmatomas has been investigated anew by my recent assistant, Dr. Tracy Putnam. He has shown how, in the process of their digestion and organisation from the dural side, communicating or non-communicating endothelial-lined spaces appear to be formed, which are distinct from the newly formed blood channels. But there is another feature of these subdural hæmatomas which seems to have escaped attention—namely, the greenish surface colour which they acquire due to the deposition of biliverdin.

The presence of bile pigments, indeed, may be identified in cerebro-spinal fluids after almost any extravasation of blood into the spaces. This is the more peculiar when one takes into consideration the fact that the bile pigments themselves do not normally pass the barrier of the choroid plexus, but are only found in the fluid in small traces in long-standing cases of deep jaundice, and perhaps only then because of functional damage to the choroidal epithelium. And though the information is not likely to be forthcoming, at least from clinical cases of icterus, I believe that even when a trace of bilirubin can be detected in the subarachnoidal fluid it will not be found in the ventricles; and if this should prove to be so, it would indicate that the pigment finds its way into the arachnoidea by way of the perivascular spaces rather than by passage through the filter of the plexus . . . .

The Meningiomas.—There remains one thing more to say of these meningocytes. It indirectly concerns the much-mooted question as to whether the cells of the reticulo-endothelial apparatus can, as Marchand and Maximow and Carrel believe, become transformed into fibroblasts. Though this is a matter more likely to receive a definite answer by the modern methods of tissue culture and supravital staining which would permit the transformation to be actually observed, nevertheless clinical and histopathological experiences may add something to the subject. And this leads me to speak of the tumours which might be expected to take origin from the cells of the apparatus under consideration, if it actually possesses the important physiological functions ascribed to it.

Endotheliomata, so-called, are known to arise in the liver, spleen, bone-marrow, and lymph glands where the cells of the apparatus in question abound, but in no situation are tumours of this category more common than in the meninges. They, consequently, are lesions long familiar to the pathologist and to the neurologist. A famous example, often referred to, was reported (as a sarcoma) by Byrom Bramwell in his early monograph on "Intracranial Tumours" (1888)—a young girl of 20 who had been admitted to the Newcastle Infirmary, Jan. 5th, 1877, in a terminal stage of compression from a growth which had given no localising symptoms. This, be it said, is a characteristic of these meningeal tumours, to slowly deform the brain in which they make a nest for themselves, often without any local symptoms whatsoever, nor indeed any pressure symptoms until the lesion may have attained an amazing bulk.

These tumours all have a common histogenesis, whether they occur in the spinal canal, taking their origin from the cells of the arachnoidal villi at the points of emergence of the spinal nerves, or as is more frequent from those which project into the venous sinuses of the cerebral dura. Unfortunately, however, they have been given by histopathologists so great a number of conflicting names that it has seemed best, partly for the purpose of emphasising their common origin and partly to get away from the unfortunate misnomer of "dural" endothelioma, to speak of them simply as meningiomas.

To the fact that they undoubtedly arise from the arachnoid cell-clusters of meningocytes Dr. Weed and I called attention in one of our early papers, though, as we found, it was not an original observation, for the suggestion had been made before by M. B. Schmidt (1902), and also long before him (1864) by the late Prof. Cleland, of Glasgow. But no one seems to have offered any explanation of the remarkable fact that the tumours invariably take their origin from the arachnoid and never from the pial side of the fluid pathway, for though "endothelial" tumours may in rare instances appear to arise from the pia they are of vascular and not mesothelial origin . . . .

Though we have only made a small beginning in the study of tumour cells by modern culture methods, such as have permitted Alexis Carrel to see macrophages become transformed into sarcoma cells, we have at least succeeded in cultivating the cells of a meningioma, and have seen cells which, unstained, were indistinguishable from tumour cells, engulf red blood corpuscles. Only by the employment of such methods can light be thrown on the much-mooted question as to whether the meningocytes actually become transformed into fibroblasts. The larger number of these clinically unmistakable tumours are almost wholly composed of endothelial cells, but certain of the older and psammomatous growths come to take on a fibrous change and may actually contain deposits of true bone; but even in the more purely fibrous examples one may always find nests of mesothelial cells. From this histological evidence, if it is dependable, one would certainly be led to conclude that the cells comprising the reticulo-endothelial apparatus of the body, and of which the cell clusters of meningocytes are obviously important representatives, may actually undergo fibroblastic transformation.

Thus we have seen whence the cerebro-spinal fluid takes its origin, how it comes to make pathways for itself by percolating through the primitive mesenchyme, how these pathways which originate from cells of the neural crest become lined with a specialised mesothelial membrane, and how minute outlets for the absorption of the fluid into the large venous channels are formed—in short, how this circulatory switch for a fluid peculiar to the ventricular and meningeal spaces comes into existence, and how it communicates with the deeper parts of the brain by perivascular tubes of the pia-arachnoid.

We have seen, too, that in addition to the fixed pavement cells lining these spaces certain other cells termed meningocytes tend to become deposited in clusters which we may figuratively describe as moored fleets of destroyers ready to cast off and engage any objectionable invader. In this respect the phagocytic functions of these cells are in every way comparable to those exercised, for example, by the clusters of Kupffer cells in the hepatic vessels, for they have the same affinity for vital dyes, the same capacity to engulf and destroy red blood corpuscles, elements which are foreign to the circulating medium of the meningeal spaces, and they possess also the capacity in this process of blood destruction of transforming hæmoglobin into bilirubin. Hence these cells may be taken to represent the reticulo-endothelial apparatus for the meningeal spaces.

We have seen also how these clusters of meningocytes may become the seat of tumefactions which, because of their being in most cases incorporated with the dura, are commonly supposed to arise from it, but which actually take their origin from the meningocytes and may be conveniently designated as meningiomas. And it would appear from the study of these tumours that their endothelial ground cells may become metamorphosed into fibroblasts.

So by a consideration of the cerebro-spinal fluid and of the cells of the membranes which enclose it, one may be led into problems of wide concern in general pathology. But with the indented purpose of this lectureship in mind, it is improper to leave the subject without calling attention to the fact that, though we may not appear to be much nearer to a cure for congenital hydrocephalus in quest of which we started out, we have at least learned many things on the way which are essentially of practical therapeutic value.

ANATOMICALLY IRREGULAR SPHENOIDAL SINUSITIS WITH OPTIC NEURITIS,

LOCALISED BY THE SUCTION SYRINGE; WITH TWO EXAMPLES.

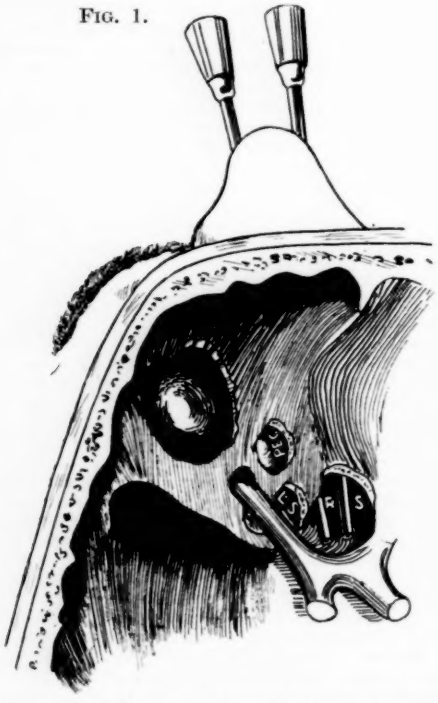
BY PATRICK WATSON-WILLIAMS, M.D. LOND.,
CONSULTING SURGEON FOR DISEASES OF EAR, NOSE, AND THROAT, BRISTOL ROYAL INFIRMARY.

THE occurrence of so-called "canalicular optic neuritis," enlargement of the blind spot, and relative scotoma, due to pyogenic infection in the sphenoidal sinuses or posterior ethmoidal cells, or less frequently in the other nasal sinuses, is well recognised, and the detection of the infective focus by the suction syringe has been described in previous communications by the writer.[1] The investigation of the sinuses in patients suffering from these optic nerve defects suspected to be of nasal origin, sometimes present special difficulties, owing, on the one hand, to the absence of any visible purulent discharge,[2] and on the other to the irregular anatomical conformation of the sphenoidal sinuses and the ethmoid cells.

Anatomical Variations in Sinuses.

Thus, one sphenoidal sinus may be large and over-developed at the expense of the other, so that the large sinus extends far beyond the mid-line and consequently the small ill-developed sinus may be, so to speak, packed away into a corner difficult of access. Again, the posterior ethmoidal cell may be unusually large and over-developed at the expense of the corresponding sphenoidal sinus, which may be so encroached on that the large ethmoidal cell occupies more or less the usual site of a sphenoidal sinus or it may lie above the sphenoidal sinus, much as a first floor room lies above the corresponding one on the ground floor. While these anatomical variations are of no moment in health, it is quite another matter when the sinuses become infected and the focal infection causes partial or complete loss of vision, or, may be, is the primary and essential cause of rheumatoid arthritis, neuritis, neurasthenia, unsoundness of mind, and so forth, any or all of which do occur. If there is plentiful purulent discharge the indications for opening and draining the involved sinuses are sufficiently plain, but unfortunately such cases are less frequently associated with the complications mentioned than are the cases where the discharge is slight, macroscopically non-purulent, and often unnoticed until inquired into. It is therefore important to detect and to localise precisely the source of any infective focus and, when confronted with anatomical irregularities in these, relatively small deep-seated sinuses, to avoid overlooking the focus, an error which may cost the patient his sight or worse.

FIG. 1.



CASE 1.—Showing the cannulæ passed through the right and left nasal passages, but both entering the large right sphenoidal sinus (R S). It will be seen that both optic nerves are in anatomical relationship with this one sinus, hence both eyes affected. The small left sinus (L S), which was proved non-infected, is lying well to the outer side of the median line.

Clinical Records.

The two subjoined examples afford an interesting contrast; in the first the large sphenoidal sinus was infected and the smaller was sterile; in the second the large sinus was sterile and the small one, so difficult to locate, was highly infected. In the first case I failed to detect my mistake until I was led to make a further exploration; this helped me to avoid a similar mistake in the second, where the error would have been disastrous to the patient, because I should perhaps have left the essential focus unrelieved.

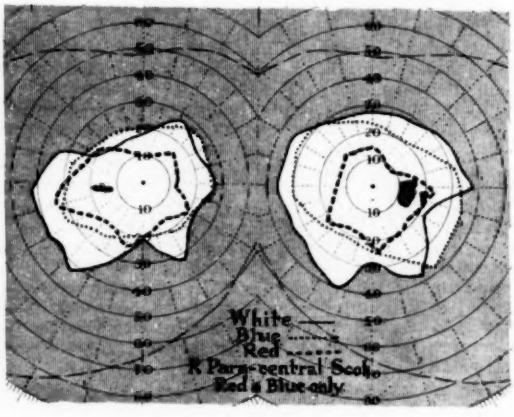
I know of no means, other than that of the adaptation of the method of exploration by the sinus syringe, by which the focal infections could have been localised during life; while post mortem such localisation could only have been of academic interest.

CASE 1.—C. R. D., male, aged 21, was referred to me by Dr S. H. Modi (Calcutta) and Dr. F. Gotla (London) for chronic sinus infection with headaches, mainly right supra-orbital. At age 9 he had undergone operation for removal of tonsils and adenoids, at age 13 further operation of turbinectomy, and again turbinectomy at age 15. At age 19 the right antrum was opened and drained, that was two years before I saw him. (Fig. 1.)

When I explored his nasal sinuses the right antrum yielded thick ropes of pus by the suction syringe, the left being clear.

FIG. 2.

L. R.



CASE 1.—July 4th, 1922. (McH. perimeter and scotoma verified by Bjerrum screen.) The visual colour-fields are all markedly contracted. The right eye chart also shows the large relative central scotoma and a smaller paracentral scotoma for red and blue only.

[1] Long Fox Lecture, 1907; Bristol Med.-Chir. Jour., 1908; Rhinology, Longmans, Green and Co., 1910.

[2] Les Sinusitis sans Pus. P. Watson-Williams, Archiv Internat. f. Laryng., &c., April, 1922.

The sphenoidal sinuses were explored and "found to communicate"; and further, the posterior ethmoidal cells were explored by cannula and suction syringe.

Film stain and culture of the sinus contents by Dr. A. T. Todd yielded results as follows: Both maxillary antra and the large right sphenoidal sinus and the posterior ethmoidal cells right and left yielded pneumococcus, polymorphonuclear cells being present in every one. But the small left sphenoidal sinus that was detected and explored later yielded neither organisms nor polymorph leucocytes, thus showing that it had escaped infection.

Examination of Visual Colour-fields, &c.—Ocular details of Mr. A. E. Iles's reports are given below under the various dates. It suffices here to state that his first revealed right enlarged blind spot and paracentral scotoma for red and blue; the left eye being normal and so corresponding to the non-infected sphenoidal sinus. (Fig. 2.)

It had appeared from the first nasal exploration that the right and left sphenoidal sinuses were both infected, but this was an error due to the one large sinus having been entered through both nasal passages. Further examination was therefore made and, by directing the cannula more outwards, one entered the true left sphenoidal sinus well to the outer side of what had been mistaken for the left sinus, and this latter did not communicate with the more central sphenoidal sinus on this the left side. Cultures of the sphenoidal sinuses showed that the smaller left side sinus which was outside the mid-line was non-infected, while the more central sinus, entered through the left nasal passage which was really the right extending across and encroaching on the left side, was highly infected with streptococcus, &c. Hence the explanation of canalicular optic neuritis restricted to the right side with apparently a double sphenoidal sinus infection.

All the nasal sinuses were opened and drained pernasally, and later a submucous resection of the septum was done to afford a more normal nasal air-way. As the result of the pernasal operations the visual colour-fields, as well as the general condition of the patient, became greatly improved. (Fig. 3.)

Reports by Mr. Iles.—Vision in each eye 6/5.

4/7/22: Fields show enlarged blind spot for red, white, and blue on right side; contraction of blue field, especially nasally right and to a less extent left. Small paracentral scotoma *red and blue* right eye.

10/11/22: Scotoma smaller, field fuller, especially R.E. white.

12/5/23: States that the right eye has "become smaller"; this was not found to be the case; the eye was as prominent as the left; no squint was detected by any test.

8/9/23: Still discharge from the nose. Paracentral scotoma right eye *to blue only*. White field not yet full, but fields of vision, especially as regards the blind spot, show improvement.

CASE 2.—C. E. C., male, aged 41, July, 1924. Markedly defective vision in right eye, which had persisted since influenza 14 months before, attended with severe pain at back of eyes and photophobia, and followed by double vision on looking towards right. Diplopia increasing, he consulted Mr. H. Snell, who noted paresis of right external rectus and suspected dental sepsis which, however, was excluded. Visual defects increased in right eye, objects being seen dimly, and Mr. Snell found the right eye divergent, the right optic disc slightly pale on the temporal side, and a central scotoma, but visual fields normal. The left eye he reported normal. The patient had noticed no nasal catarrh, but the rhinologist to whom he was referred kindly sent the following note:—

"No pus seen in nose. Sphenoid and posterior ethmoid cells washed out with Watson-Williams' syringe, also right antrum—washings clear. Culture report: No growth obtained on aerobic cultivation for 48 hours."

The negative nasal findings in view of the symptoms at this stage led to the case being diagnosed as a missed encephalitis lethargica.

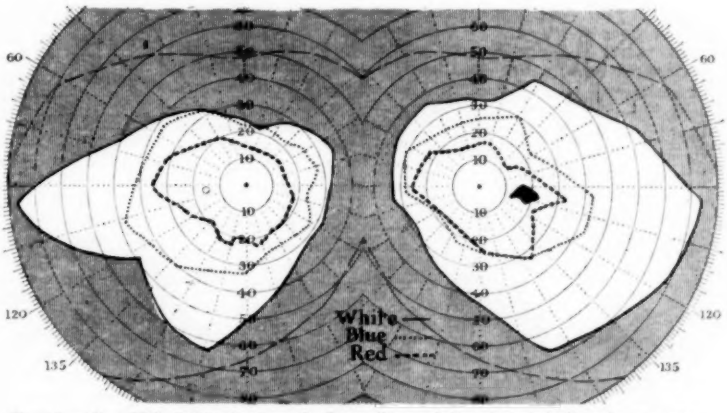
Meanwhile the post-nasal catarrh had become much more noticeable, and it was at this stage, 14 months after the initial attack, that the patient came under my notice.

The fundus oculi and visual colour-fields, right and left, were examined by Mr. R. E. Chambers, who found a very large blind spot on the right side and some contraction of visual fields, both fundi normal, and no trace of diplopia nor of past optic neuritis. Anterior rhinoscopy revealed nothing abnormal and no discharge observed. Endorhinoscopy (Holmes) showed only a few indefinite strings of muco-pus, but the mucosal vessels were abnormally full on the right side posteriorly. (Fig. 4.)

Exploration by the Author's Suction Syringe.—Right antrum.—Film stain: A little pus, mononuclear polymorphs, some phagocytosis, streptococcus. Culture: Pure streptococcus. Left antrum.—Film: Occasional leucocyte. Culture: Negative. Right sphenoid.—Film: Mononuclear pus, streptococcus, no phagocytosis. Culture: Pure streptococcus. Left sphenoid (per right nose): Debris only. Culture and film negative. Right posterior ethmoid.—Film: Mucus—few mononuclears. Culture: *Staphylococcus aureus* only. (Fig. 5.)

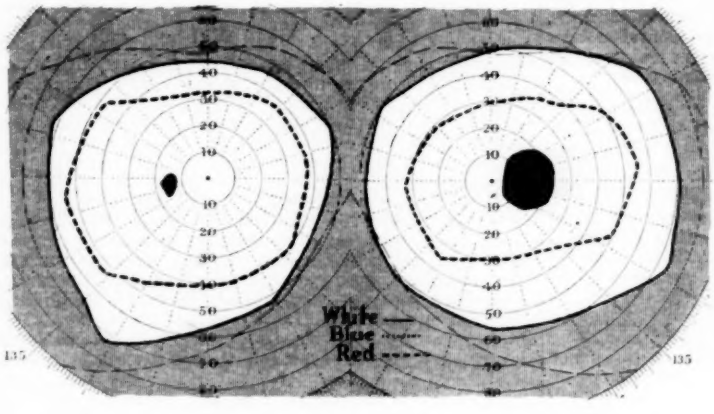
After repeated lavage, &c., of the opened sinuses, Mr.

FIG. 3.



CASE 1.—Nov. 10th, 1922. Scotoma in R smaller and the paracentral scotoma gone. (Later, September, 1923, white fields normal.)

FIG. 4.



CASE 2.—Visual colour-fields and blind spots. (McHardy perimeter and enlarged blind spots verified by Bjerrum screen with 1 mm. white disc.) (Mr. E. R. Chambers.)

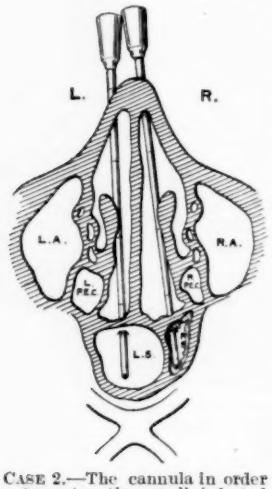
Chambers examined the eyes and reported August 16th, 1924—i.e. five weeks after his first report: Vision in both eyes normal, visual fields for white and colours quite full, and there was no pathological blind spot selected by the perimeter. Central colour vision normal.

Seen again and tested in October, 1924, and he was then normal in every way from the ophthalmological point of view.

Discussion.

An interesting point is that the sterile left sphenoid extending well across the midline was entered as readily through the right as through the left nasal passage. Suspecting, therefore, that the right sphenoid was probably small and ill-developed and had been missed, another cannula was entered, directed well outwards, and the real right sphenoid was thus entered and explored, and yielded pure streptococcus on culture and film. The test applied was as follows. Two cannulæ were inserted, one through the right nasal passage, the other through the left, so that both had entered what was presumed to be the large left sphenoidal sinus. Then, on attaching a syringe to one cannula and syringing down sterile water, it escaped out through the cannula in the other side. Again two cannulæ were inserted both through the right nasal passage, one into the left sphenoid, the other directed outwards to enter the right sphenoid sinus, and on syringing water down the one it did not come up and escape by the other, showing that the two cannulæ passed in through the right nose were in different cavities. This is the method I usually adopt to determine whether one has entered one cavity with two cannulæ or that the two cannulæ are in different, though adjacent, cavities and was used in connexion with both of these cases.

FIG. 5.



CASE 2.—The cannula in order to enter the small infected right sphenoidal sinus had to be directed well to the outer side.

The practical point is that one thereby gains precise information as to the actual source of the extracted sinus contents and the bacteriological investigation tells us whether it is or is not infected.

CONGRESS ON VENEREAL DISEASE AT PARIS.—Following the Wembley Congress, organised by the British Social Hygiene Council, a meeting was held in Paris of the Union Internationale contre le Peril Vénérien, where decisions were taken with a view of further combating venereal disease. Great Britain, France, Germany, the United States of America, and 12 other countries were represented by delegates from the recognised social hygiene organisations, by delegates from the various National Red Cross Societies, and by a number of official Government representatives. Of the many decisions reached the most striking was the unanimous decision that the regulation of prostitution was inconsistent with efforts to eliminate venereal disease. This same point was brought out so long ago as 1913 at the International Medical Congress held in London. In Paris the system of control of prostitution was condemned on medical grounds, and thus after 12 years the decision reached in London was endorsed. The Congress dealt particularly with the difficulty of eliminating disease from the mercantile marine, with the measures which should be taken in connexion with frontiers, with the problem of prostitution, and with emigration situations. Certain of the shipping interests agreed cordially to coöperate by financial assistance with the measures recommended in the mercantile marine. The Council of Direction adopted a report recommending measures against prostitution. These include wider propaganda and stricter legislation.

THE RELATION OF NEPHRITIS IN EGYPT TO INTESTINAL INFECTION.

BY H. B. DAY, *M.C.*, M.D., F.R.C.P. LOND.,
LATE PROFESSOR OF CLINICAL MEDICINE, ROYAL SCHOOL OF MEDICINE, CAIRO.

IN a paper published in THE LANCET[1] five years ago I stated that nephritis, as met with in Egypt, was usually due to bacilli of coliform type derived from the intestine. This opinion was based on the results of bacteriological examination of the urine, the experimental reproduction of nephritis in animals by injection of the bacilli isolated, and the favourable effect of vaccines in human cases. These findings are not supported by the general run of experience in this country. Most observers report that streptococci appear the commonest cause of acute glomerulonephritis and that in many patients sore throat precedes the attack.[2,3] In some cases, however, coliform bacilli are deemed responsible, especially when signs of urinary tract infection are present.

In this paper I wish to bring forward evidence to show that in Egypt we have largely to deal with a form of nephritis that is intimately connected with intestinal disease. For this purpose I have analysed some 100 cases of nephritis with œdema admitted to my wards in Kasr-el-Ainy Hospital, Cairo, during the last few years. The distinguishing feature of œdema has been chosen as indicating a lesion sufficiently advanced to cause failure of an important renal function and not as a necessary criterion of acute or parenchymatous nephritis. While the ordinary case of granular kidney has thus been excluded, a further omission has been made of renal patients who had developed dropsy in connexion with signs of heart failure.

Clinical Types.

For investigations into ætiology, the more acute forms are most suitable. Hence a simple division of the series into (*a*) acute, (*b*) syphilitic, and (*c*) chronic forms has been made. The distinction between acute and chronic cases is beset with certain difficulties, but apart from considerations of onset, duration, symptoms, and course, there is one feature which certainly reveals the existence of an acute inflammation of the kidneys—namely, the presence of abundant blood casts or cellular casts in the urine. This feature has therefore been taken as the main criterion of an acute nephritis, although perhaps unduly exclusive. To this group one-third (34 cases) of the total number belong. In five patients out of the total of 100 there was strong evidence that syphilis was responsible for the renal lesion. These cases have been grouped together irrespective of the nature of onset or the duration of their symptoms. The remaining group, comprising 61 out of 100 cases, is mainly composed of chronic forms of nephritis. In what proportion the onset had been acute or gradual was impossible to determine; five patients described a previous attack with subsequent return of dropsy.

Causative Factors.

Antecedent Conditions.—In 85 per cent. of the acute cases there appeared a causal connexion between the renal inflammation and some antecedent or concomitant infection. A similar connexion could only be established in a minority of the more chronic forms, for the patients had often forgotten slight illnesses in the past, and the appearance of œdema only fixed the date of gross renal failure and not necessarily the time of onset of kidney disease. Among 27 cases of acute nephritis whose clinical history was recorded, no less than 20 had been incapacitated by a definite illness for some time prior to the appearance of renal symptoms. This history was often

substantiated by the persistence of such antecedent symptoms after admission to hospital, while other patients showed similar signs which had not been the subject of complaint owing to their milder nature.

These preceding conditions are tabulated below :—

—	Antecedent history of	Persisted on entry.	Found in others.
Fever—generally prolonged	8	6	6
Fever followed by dysentery or diarrhœa ..	7	4	2
Acute dysentery	5	1	2
Total	20 (of 27)	21 (of 34)	

In no instance could an antecedent fever be identified with scarlet fever; the prolonged course was usually sufficient to negative this. The fever was proved to be malaria in one patient, and in two others may have been due to an acute pyelitis.

While the importance of bowel infections is brought out in the above table, examination of the patients disclosed some conditions frequently associated with nephritis, which explained the significance of the fever and dysentery described.

(*a*) *Bilharzia Mansoni Infection.*—Definite signs of this were present in 55 per cent. of acute cases of nephritis, a much higher proportion than is found among hospital patients in general. The early signs are prolonged fever followed by more or less dysentery (often transient), and later an enlargement of the liver and spleen. Egyptian patients only notice these symptoms when pronounced, and frequently one or other is slight. Hence it appears that the preceding illness described by so many patients was due to this type of bilharzial infection, and that nephritis was apt to occur at the time when ova had made breaches in the intestinal mucosa. Among patients admitted for splenomegaly in a later stage without obvious intestinal lesions, there was no special tendency to nephritis. But renal disease was fairly common in cases of chronic bilharzial dysentery or advanced cirrhosis, when the general wasting and loss of resistance associated with hepatic and pancreatic insufficiency often predisposed to intestinal disorder and infection.

(*b*) *Bilharzia Hæmatobium Infection.* — Urinary bilharziasis was found in one-third of the renal cases, an incidence too low to be significant in itself, considering the wide prevalence of this disease. But while bilharzial disease of the bladder alone appeared to have little influence on the development of nephritis, the frequent involvement of the ureters undoubtedly predisposes to renal infection. The experiments of Lepper[4] showed that injections of *B. coli* into the blood-stream of rabbits regularly caused kidney lesions if the ureter was temporarily obstructed.

(*c*) *Intestinal Worms.*—Of these infestations, so common in Egypt, ankylostomiasis was most frequently associated with nephritis, though much less often than affections of the large intestine. Mistakes in diagnosis may occur in severe cases of anæmia when widespread œdema is present and sometimes albuminuria from œdema of the kidneys, thus simulating nephritis.

Bacteriological Results.

A routine bacteriological examination of the catheter urine was made in every case, and the results confirmed the work mentioned previously. Great care is necessary in the collection of samples and was rewarded by very uniform results in males, though in females contamination was relatively frequent. The procedure adopted was as follows :—

The external parts were carefully cleansed with antiseptic solution ; since male Egyptians are circumcised one source of contamination was absent. A soft rubber catheter was passed by gloved hands and some urine allowed to escape. An attendant then compressed the catheter ; the end was flicked clear of urine and sterilised in a flame. A few c.cm. of urine were next collected quickly in a sterile tube during momentary removal of its rubber stopper. The specimen was kept standing for an hour (unless turbid) to allow suspended matter to settle, when a culture tube was inoculated from the deepest portion. The culture and urine tube were kept 24 hours at 37° C. Should the culture tube show no growth in this time a fresh inoculation was made from the deposit in the urine tube that had been incubated for 24 hours.

The results may be summarised thus :—

(*a*) In cases of acute nephritis positive results from the first culture were almost invariably obtained. One patient—seen in private and not included in the series—gave a negative result on two separate occasions. In this case the acute nephritis had followed influenza, and ordinary media were used.

(*b*) The urine from cases of chronic nephritis showed a general correspondence between the microscopical picture of the sediment and the bacteriological examination. When cells were visible, included in the casts or free, a positive culture was usually obtained either from the fresh or the incubated specimen. If only granular and hyaline casts were present the urine proved sterile in the great majority of cases.

(*c*) The three uncomplicated cases of syphilitic nephritis showed a sterile urine.

(*d*) From patients whose urine contained definite collections of pus cells, usually from a cystitis complicating old bilharzial disease, a growth of staphylococci was usually obtained, either pure or in addition to bacilli. When there was much pus a bacillary or mixed growth was the rule. Streptococci were found in one case of septic nephritis.

(*e*) In uncomplicated cases of nephritis a pure growth of bacilli of intestinal types was generally found on culture of the urine. Their cultural properties were investigated by Dr. J. K. Clarke, who found that most belonged to the coli-typhoid type. Alkaligenes, non-lactose fermenters, and *B. pyocyaneus* were found in several.

Experimentally, the nephrotoxic properties of these organisms varied considerably. The more typical *B. coli* obtained from cases of nephritis with obvious bacilluria had little effect, whereas the coliform organisms obtained from the more common form of nephritis reproduced nephritis in a series of animals inoculated either subcutaneously or intraperitoneally. A diversity was also noted by E. Lepper, who reported that one strain of *B. coli* used in her experiments had a decided toxic action on the kidneys of rabbits injected intravenously.[4] The effect on the kidneys persisted long after the initial phase of bacillæmia in the animals, and similar lesions were found in the liver, as in cases of nephritis induced by chemical poisons. The staphylococci found in cases of pyuria had no selective effect on the kidneys of animals injected.

Agglutination tests on patients yielded unsatisfactory results, in keeping with the similar experience of pathologists regarding simple bacilluria.

Complications.

Among the complications that developed in the course of a nephritis there are two forms of special importance.

1. *Respiratory.*—Bronchitis was tolerably common and evenly distributed among the various groups, occurring in five acute, one syphilitic, and nine chronic cases, but it appeared more commonly as a later complication than an antecedent condition. In one patient pulmonary tuberculosis definitely preceded nephritis. One renal case was admitted with severe pneumonia which proved fatal, and another died as the result of an acute serositis affecting the pleuræ and peritoneum. During their stay in hospital two patients contracted influenza (then epidemic), another developed broncho-pneumonia, and three others a febrile pleurisy. In all six patients recovery was uneventful and only temporarily delayed progress.

2. *Intestinal.*—An acute febrile diarrhœa or dysentery developed suddenly in nine of the nephritis cases. Unless promptly controlled this complication had a most prejudicial effect on the renal and general condition, and in four cases was rapidly fatal. There is much reason to fear that cross-infection from other patients suffering from intestinal disease was often responsible—a disaster most difficult to avoid with patients of the most unhygienic habits in crowded wards. The condition certainly seemed of infective origin, and in most of the patients there was no apprehension nor signs of uræmia beforehand.

Treatment.

As a result of the investigations described—both clinical and bacteriological—the conclusion seemed warranted that most cases of nephritis in Egypt arose as a complication of an intestinal infection. Hence the opportunity was taken to treat suitable cases on this assumption, while not neglecting usual measures. For the ordinary case without present diarrhœa, the usual purgative treatment given for acute nephritis may help to diminish a source of intoxication. Intestinal antiseptics proved of very limited value. For patients with obvious intestinal lesions a direct therapy was indicated. Some forms of chronic dysentery of amœbic or bilharzial origin responded to emetine injections and showed a distinct improvement in the renal condition as soon as the intestinal infection was controlled. Similarly patients with nephritis complicating ankylostomiasis benefited by specific treatment, as in the case illustrated by Chart 1.

A man of 25 had suffered from fissure of the anus for six months and general dropsy for the last four months. On admission there was extensive œdema with ascites. The urine contained a large trace of albumin with fine, long granular and a few larger cellular casts. He was anæmic (Hb. 60 per cent.) and the stool contained ankylostoma ova. Appropriate anthelmintics were given in addition to the usual treatment for nephritis. A slow improvement followed, with a sudden diuresis as soon as the worms had been removed. In about three weeks after entry the dropsy had disappeared with a loss of 30 lb. in weight.

For acute cases of nephritis and pyelitis when bacilli were plentiful in the urine, the free administration of alkali appeared beneficial, as in bacilluria. Urinary antiseptics were of little avail and the impaired excretory powers of the kidneys prevents the usual degree of concentration in the urine.

Vaccine treatment proved the best means of treatment in most cases of bacillary nephritis. Some examples of their action have been given in a former publication,[1] but here I wish to describe a few cases which illustrate special points in their use. Chart 2 shows the effect of small repeated doses in a chronic case which had not responded to the usual treatment.

A man, aged 26, was admitted for general œdema which had lasted for 14 months. The urine averaged 900 c.cm. daily with a low sp. gr. but an albuminuria of 6 parts per 1000. There were irregular recurrences of fever with chronic enlargement of the liver and spleen, not at that date recognised as evidence of *Bilharzia mansoni* infection. Examination of the urine showed a deposit of muco-pus containing some granular casts, and a catheter specimen gave a good growth of a coliform bacillus. The administration of an autogenous vaccine induced a definite diuresis with relief of œdema.

Through the courtesy of a colleague, Dr. Abd'el Aziz Ismail, I was enabled to try vaccine treatment on a case of nephritis when the patient stayed sufficient time in hospital to show the full effect (Chart 3).

A male, aged 40, had suffered from severe dysentery for six weeks, and for the two months following from an œdema which had reached formidable dimensions by the time of admission. There was irregular fever associated with chronic dysentery (five to six stools daily), probably founded on bilharzial infection. The urine showed the usual features of a chronic nephritis. In this case urea was tried as a diuretic on account of the oliguria present; its use was followed by a marked rise in the amount of urine excreted, but the albuminuria just afterwards increased from 3 to 10 parts per 1000. Meanwhile emetine injections had been given perseveringly, but without effect so far on the fever and dysentery. The injection of an autogenous vaccine had a diuretic effect, and the albuminuria was reduced. Continued treatment with emetine and vaccine resulted in abolition of the fever, then abatement of the diarrhœa, with a marked diuresis and disappearance of the dropsy. The albumin diminished rapidly to a trace.

Experience in other cases showed that vaccines generally had a very definite effect on the renal condition and often on fever, if present, but did not check a diarrhœa. The explanation is probably that diarrhœa results from various lesions, such as ulcers originally due to amœbic or bilharzial infection through which coliform bacilli have been absorbed. Appropriate vaccine then checks the effects of such absorption without influencing the intestinal lesion.

While an autogenous vaccine was naturally preferred, equally good results were often obtained from an allied strain of organism. In one patient temporary improvement followed the use of a stock vaccine, while an autogenous vaccine used later brought about a relapse. In the light of later experience this anomaly is explained by the inappropriate dosage, a matter of considerable importance.

The first patients selected for vaccine treatment were non-resolving cases of nephritis in whom œdema persisted. These reacted to doses of 25 to 50 millions as a rule. But when the nephritis is acute, with oliguria or fever, or if high albuminuria is present, the kidneys seem much more sensitive and such doses may do more harm than good. Should a non-autogenous vaccine be used, a comparatively large dose may prove safe and beneficial when the same dose of autogenous vaccine is too large. A particularly interesting case, illustrating the importance of the right dose, is shown in Chart 4.

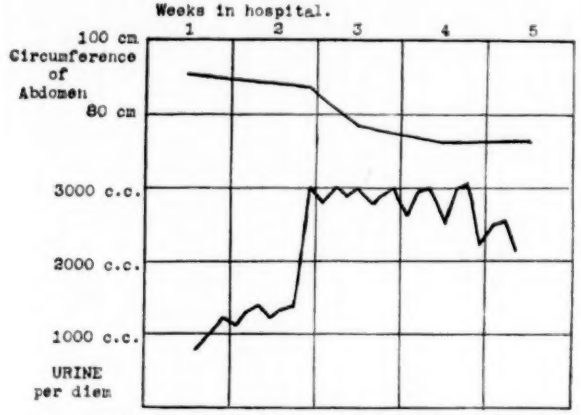
The patient, a woman of 25, who had had no previous illness nor been pregnant, was admitted to another section for a general œdema of a fortnight's duration. The daily quantity of urine averaged 600 c.cm. and there was a considerable amount of albumin. Under the usual treatment the œdema diminished and the output of urine rose to 900 c.cm. when she took her discharge. A week later the dropsy recurred and so rapidly increased that in a few days she returned to hospital and was admitted to my ward. Her condition now resisted the treatment which had proved beneficial before. The urine averaged 750 c.cm. daily, with an albuminuria varying from 10 to 20 parts per 1000, and contained a large number of casts—granular and hyaline with few included cells. There were no signs of complicating disorders, and the Wassermann reaction was negative. A catheter specimen gave a good growth of Gram-negative bacilli, which did not ferment lactose. Renal efficiency tests gave good results; the urea concentration was high, blood-urea 61 mg. per 100 c.cm., and the phthalein excretion 43·5 for the first hour and 32·5 for the second. The blood pressure was normal: 120 and 80 mm. Hg.

The condition therefore corresponded clinically to Epstein's nephrosis. Intravenous injections of calcium chloride and the administration of urea by mouth (15 g. daily) were ineffective. Increased protein feeding unfortunately increased the œdema and was abandoned.

Vaccine treatment with the bacillus found in the urine was begun with an initial dose of 25 millions which rather aggravated the oliguria, and smaller doses of 10 and 15 millions used subsequently failed to improve her condition. The patient had now been two months in hospital without benefit. I then tried giving the vaccine by mouth on an empty stomach. The first dose, 15 millions, caused a slight fall in the urinary excretion followed by a gradual rise; a week later a dose of 20 millions by mouth caused a fall without a rise later. A third dose of 15 millions caused no fall, but the later effects were apparently neutralised by the onset of a septic infection in the flank accompanied by fever. As soon as this subsided the oral administration of the vaccine was recommenced, using quite small doses, 10-15-20 millions at short intervals. This induced a diuresis which removed the extensive œdema. Owing to the breakage of the bottle the autogenous vaccine was lost, but fortunately a substitute vaccine tried proved equally efficacious.

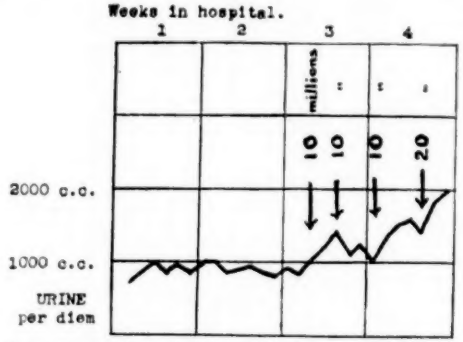
On discharge there remained an albuminuria of about 5 parts per 1000. The patient attended regularly as an out-patient and at first showed an increase of albuminuria

CHART 1.



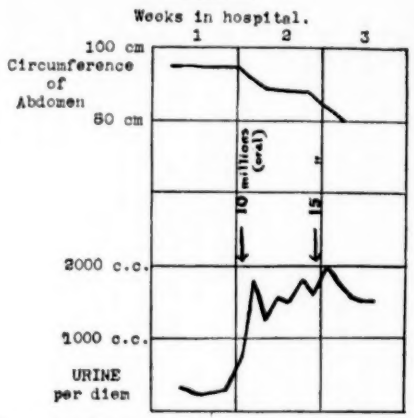
Case of ankylostomiasis complicated by nephritis with general œdema and ascites for four months. Anthelmintic treatment caused a gradual improvement with a sudden diuresis as soon as all the worms were expelled.

CHART 2.



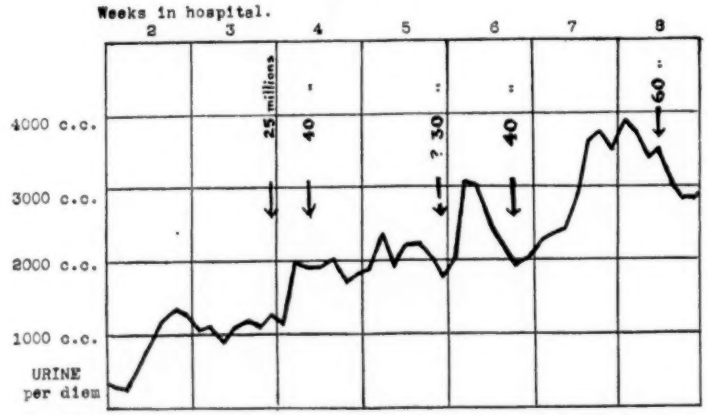
Case of chronic nephritis with œdema that had persisted for 14 months. Patient had *Bilharzia mansoni* infection with recurrences of pyrexia. Treatment by injection of an autogenous vaccine, as indicated by the arrows, caused diuresis and relieved the œdema.

CHART 5.



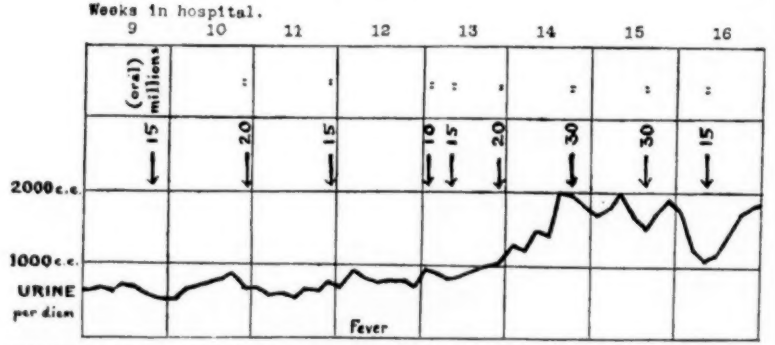
Case of severe nephritis with high albuminuria, oliguria, and extreme dropsy with ascites. Chart shows immediate diuresis (accompanied by a striking diminution in the albuminuria) on treatment by vaccine given orally. This occurred in spite of an acute diarrhœa and fever that had developed two days before.

CHART 3.



Case of prolonged dysentery with fever (due to *Bilharzia mansoni* infection) complicated with nephritis. On admission there was much œdema and oliguria. The chart shows some diuresis in the second week following the administration of urea. An autogenous vaccine was afterwards given by injection as indicated in the chart. Emetine was given during the third, fourth, and fifth weeks. The fever and dysentery declined in the sixth week. By the eighth week the albumin had decreased to a trace; the diuresis continued for another month.

CHART 4.



Case of prolonged nephritis with much œdema and high albuminuria. No improvement took place during the first eight weeks in hospital, before the chart commences. The chart records the effect on the urinary output of doses of an autogenous vaccine given by mouth. The last dose shown was of a substitute vaccine.

with a slight return of œdema on the resumption of her ordinary life, but with weekly doses of vaccine (oral) the albuminuria was reduced till it reached a steady level of 3 per 1000.

Since no further improvement was expected, the patient was again admitted to hospital. The phthalein test now revealed a considerable deterioration of renal efficiency, the figures being 11 per cent. in the first hour and 14 per cent. in the second, a total of 25 as compared with 76 obtained six months previously. Decapsulation was therefore performed on both sides under stovaine anæsthesia. Recovery was uneventful, and on discharge the urine had a sp. gr. of 1020 and 1½ parts per 1000 albumin. The patient has been very well since, has only slight albuminuria (¾ per 1000), a normal blood pressure, and excellent renal efficiency by the phthalein test—58 per cent. in the first and 25 per cent. in the second hour.

The experience gained from this patient suggests that in some cases there is a hypersensitiveness of the kidneys acquired in the course of a renal inflammation towards the exciting antigen, which may be reduced by small doses of vaccine. On the assumption that the intestinal tract is the original source of bacillary infection, immunisation by the oral route appears a logical procedure, following the observations of Besredka[6] and other French workers. The immediate response to such treatment shown in the next case (Chart 5) suggests that the dissolved antigen in the vaccine may be responsible, as has been shown by Perlweig and his co-workers to exist.[7]

This patient, a boy of 15, had been ill three months with severe nephritis. On admission there was extreme œdema with ascites and double hydrothorax. Only 250 c.cm. were passed daily, the sp. gr. was 1031, and the albumin content 18 and 20 parts per 1000, as measured on two separate occasions. Microscopically the casts were mostly of the granular variety, some being of large diameter. There were few free cells and not many embedded in the casts. On account of the swelling of the genitals a catheter was passed with difficulty and the specimen only yielded a growth of staphylococcus which appeared a simple contamination. The Wassermann was negative. The abdomen was tapped the day after admission and 2200 c.cm. withdrawn, but no benefit to the renal condition ensued during the following week. A small dose (10 millions) of the vaccine used as a substitute in the preceding case was then given by mouth. The result was immediate. Diuresis was established and next day the urine contained but a trace of albumin.

Considerations of space prevent reference to other cases which showed satisfactory results from this treatment. Of special interest is the favourable action of stock vaccine in some chronic renal cases when bacilli were not found in the urine.[1] It would appear that kidney disease may be kept up by absorption of toxins from the intestine without excretion of bacilli being detected. The suggestion that the vaccine acts as a simple diuretic is negatived by its failure to influence the output of urine in non-renal cases when used in similar doses.

Summary.

The onset of acute or subacute nephritis in Egypt is commonly preceded by intestinal infection. Bacteriological examination of the urine in such cases shows the presence of bacilli of intestinal types. These bacilli are capable of reproducing nephritis in laboratory animals. Cure of an intestinal lesion was found to benefit a consecutive nephritis. Vaccine treatment was frequently successful in these cases of infective nephritis. The dose should be inversely proportional to the severity of the renal symptoms. The oral administration of vaccine was found efficacious.

References.

1. Day, H. B., and Clarke, J. K.: THE LANCET, 1920, ii., 546.
2. Scheidemandel, E.: Münch. Med. Woch., 1913, ii., 1722 and 1788.
3. Eason, J., and Smith, G. L. Malcolm: THE LANCET, 1924, ii., 639.
4. Lepper, E.: Jour. Path. and Bact., xxiv., No. 2.
5. Epstein, A. A.: Amer. Jour. Med. Sci., November, 1917, and February, 1922.
6. Besredka, A.: Ann. de l'Inst. Pasteur, 1919, xxxiii., No. 5.
7. Perlweig, Wells, and Amoss: Proc. Soc. Exp. Biol. and Med., 1923, xxi., 28.

RESPIRATORY CATARRH IN CHILDREN.[1]

BY RICHARD C. CLARKE, O.B.E., M.B. BRISTOL, M.R.C.P. LOND.,

HON. PHYSICIAN, BRISTOL ROYAL INFIRMARY; HON. PHYSICIAN, COSSHAM MEMORIAL HOSPITAL; HON. PHYSICIAN, BRISTOL ORTHOPÆDIC HOSPITAL.

THE catarrhal child has received far too little attention, and though common enough in all classes its frequency is not sufficiently realised. It may be that until we started to examine in a routine manner so-called healthy infants we saw few cases; the doctor was not called in except for acute bronchitis or broncho-pneumonia, and the consequences, or rather the beginnings of catarrh in children, were overlooked.

The first surprise that I had when conducting routine examinations in young infants, 3 to 6 weeks old, was to note that at least half of them already had respiratory catarrh. I have been through the last thousand of my case-sheets and find that 499 were already infected. On questioning the mothers the usual answer was "Yes, 'e was born with it." The percentage of affected seems very high, but it must be remembered that the patients were drawn from the lower social strata of the population.

The signs on which the diagnosis was based in this series were: (1) Snuffles; (2) sucking in of the lower ribs (Harrison's sulcus); (3) definite bronchial catarrh, found by auscultation.

Before examining the reasons for this extensive infection of the respiratory tract in early life, the effects, immediate and remote, arising directly or indirectly from it, may be noted; some of them are from direct observation, and some of them may be classed as hypotheses.

(1) *The Nose.*—The first thing that happens when an infant gets a cold is that the nose becomes wholly or partially blocked. One effect of this is that the whole respiratory mechanism gets thrown out of gear, owing to the amazing efforts that a young child makes to breathe through a blocked nose, and its reluctance to breathe through its mouth. Anyone can observe this by holding the nostrils of a very young infant. After several unsuccessful efforts to breathe through its nose it wakes up and cries and then, but not till then, will air enter the chest. This nasal obstruction from catarrh leads immediately to sucking in the lower ribs, and to the formation of what is known as Harrison's sulcus. Tradition and the text-books attribute this sign to rickets, but it is so often seen in non-rickety babies, indeed, as a permanent deformity in infants too young for rickets. Rickets may, when combined with nasal obstruction, help to exaggerate and fix the deformity, but the disease has, in my view, nothing to do with its original formation.

The next serious effect of partial nasal obstruction is the difficulty of feeding. Modern opinion attributes the failure of breast-feeding, when it occurs, to the baby and not to the mother. It is thought that all women are potentially good milkers, but that some babies are bad suckers, and that the milk ceases from lack of stimulus. In such cases there is no more potent cause of inadequate sucking than partial or complete nasal obstruction, and where the result—a too frequent one—is failure of the milk-supply, a disaster occurs of the first magnitude in the poorer classes.

The earlier the infant suffers with nasal catarrh, the longer the complaint takes to clear up; in fact, in the majority of instances it never clears up entirely, but becomes more or less chronic with acute exacerbations. And the results of chronic nasal catarrh as the baby grows up are serious; probably it is the one and only cause of the disease known as "tonsils and adenoids." This is to adopt the view that chronic enlargement of the pharyngeal and faucial tonsils is

[1] An address given to the Bristol Medico-Chirurgical Society.

merely one manifestation of chronic nasal catarrh, the condition being the effect of infection of the upper air passages renewed and re-renewed. Another result is chronic suppurative rhinitis with mal-development of the nasal passages, leading to chronic sinus troubles and all their complications and sequelæ.

An indirect result of bad nasal catarrh in infants, especially if combined with sore buttocks and failure to gain weight from the feeding difficulty, may be a mistaken diagnosis of congenital syphilis, for snuffles, napkin rash and malnutrition, give a fairly complete picture of that disease.

(2) *The Ears.*—Among the hospital class, discharging ears in infants are sadly common. In fact, the medical officer is seldom told of it, as it is regarded as an inevitable concomitant of teething and of no real importance. It generally clears up quickly and relapses with every fresh acute exacerbation of the catarrh. It is not unreasonable to consider that the otitis media of school-children is generally a relapse, a supposition which explains the fact, with which all of us are familiar, that the vast majority of the out-patient class are deafish—to put it mildly. Histories of previous infantile attacks of otitis media are difficult to get, but often I have had the experience of the mother denying a previous attack, when I have had the previous occurrence noted.

(3) *The Chest.*—The following may be rather a surprising statement, but every baby that I have examined under 4 weeks old, and it is something over 400, that has had nasal catarrh has had definite signs of bronchial catarrh. In fact, in almost a majority, the bronchial catarrh is the plainest feature of the disease; the nasal catarrh may not be obvious, though the mother will generally have noticed it, but the tell-tale sucking in of the lower ribs is present.

A few infants from 4 to 6 weeks old escape bronchial catarrh with a cold, but after the age of 3 months this is usual. In only two cases have I noted it after 6 months in a chest previously clear. It would appear that every day of its life that one can put off the inevitable cold in an infant, the more remote becomes the chance of infection of the lower respiratory tract. Under 3 weeks of age the infection is a certainty, but every week after decreases the risk, which is negligible after 6 months of age.

Once a child is bronchitic, every fresh cold, in the words of the nursery, "flies to its chest" and causes an exacerbation of bronchial signs and symptoms. In fact, there is many a child of under 6 months that one would describe as a chronic bronchitic.

As these children grow up the acute attacks continue, though in the intermissions there are always signs in the chest, if they are carefully listened to. If we watch such an infant week by week we find signs either of chronic or acute bronchitis always. I have not watched these children yet beyond 5 years old and only a few up till then, but I submit that the process probably goes on, if to a less degree, through school life, and it is not an improbable speculation that the bronchitic baby is the precursor of the bronchitic school-child and that the bronchitic child is father to the chronic bronchitic adult. As far as I am aware, this has not been suggested before, and one observation in its support is that on the pensions boards nearly every ex-soldier pensioned for chronic bronchitis shows a well-marked Harrison's sulcus, as a fair proof that they were catarrhal babies. This idea that the catarrhal bronchitic baby is the sole ancestor of the chronic bronchitic is speculative, but it is worth following up. The proof of it presents difficulties in the adult, as infantile histories of bronchitis are hard to obtain with any accuracy.

There are at any rate very severe handicaps to the bronchitic child, for attacks of broncho-pneumonia occur with frequency, while measles, whooping-cough, and even the administration of an anæsthetic present added risks to such a child. From these clinical observations one main deduction may be drawn; it is that the earlier in life and more frequent the attacks of catarrh on the child occur, the more damage do they do and the more disastrous is the result.

The question of the pathogenesis is bound up with the factors which control the spread of infectious disease and with the local and general immunity. The position is well put out by Dudley,[2] and I am in entire agreement with his views as expressed.

The development of respiratory catarrh probably depends on two main factors: (1) The number and virulence of the catarrhal organisms which attack the mucous membrane; (2) the local resistance of the mucous membrane and the general immunity of the body.

It is probable that a given mucous membrane can deal with a given number of organisms in a given time—it can deal with x organisms per minute, the value x depending on the virulence of the organism and the resisting power of the mucous membrane.

An individual with a catarrh breathes out organisms suspended in particles of moisture very much in the same way that a person breathes out smoke when smoking tobacco. That is, as the smoke leaves the mouth there is first a concentrated puff and then it gradually disseminates into the room where, in the absence of proper ventilation, it hangs about the room. So it is with a person suffering from a respiratory catarrh. The concentrated breath is highly charged with organisms, which in the absence of proper ventilation will gradually diffuse throughout the room. On this theory then, one can get the $x+1$, the morbid dose, either by a direct hit from a cough, sneeze, &c., or by staying too long in an atmosphere too heavily loaded with organisms. This has been proved by exposing plate cultures in such circumstances. This morbid dose, this $x+1$, is determined by the virulence of the organisms and the local and general resistance, but the local resistance, the mucous membrane, must be the main barrier to catarrhal infection. That the mucous membranes have local resistance has been proved by A. Fleming.[3] Apart from the possibility of chemical disinfectants, he has shown that the mucous membrane secretes a definite bacteriolytic agent. What would appear from clinical observations is: (1) that the very young mucous membrane is deficient in resistance; (2) that the mucous membrane, which has been the object of early and repeated attacks, either loses or never acquires an adequate resistance.

The view that the general immunity of a very young baby is less than that of its mother is not generally held, but there is a good deal of clinical evidence to support the theory by analogy that the local resistance is deficient. For instance, the intestinal tract is notoriously easy to infect in the young infant, and the skin is extremely susceptible to staphylococcal infection. In the respiratory tract the frequency of catarrh under 3 weeks old, the undue chronicity of it when it does occur, and the rapid spread into the lungs under 6 weeks old affords considerable proof of early local deficiency. And pathological attacks of catarrh on these mucous membranes, respiratory and intestinal, do not confer immunity but rather the reverse. The ideas of Prof. Kenelm Digby, of Hong-Kong ("Immunity in Health," 1919), are to my mind correct—a normal child acquires its local, and in part its general resistance to catarrhal organisms, by frequent submorbid doses of these organisms. But morbid doses—that is to say big enough doses to cause an inflammatory reaction, do not confer local immunity, but cause more or less permanent damage to the epithelium of the respiratory mucous membrane. This would be true whether respiratory catarrhs are caused by well-known catarrhal organisms, or whether some unknown filter-passer is the "villain of the piece."

In the prevention of this condition these theoretical views become of extreme importance. The morbid dose of catarrhal organisms on the respiratory mucous membranes—what may be styled the "knock out"

[2] THE LANCET, 1924, i., 1141.
[3] Proceedings of the Royal Society, 1922.

dose—must be postponed as long as possible. There can be no fear of the child missing the submorbid or immunising dose. This postponement may seem impossible to secure among the badly housed lower stratum of the population, though among the decently housed and not overcrowded class it is fairly easy. We have the two things to aim at—viz.: (1) to avoid what has been styled the direct hit, and (2) to keep an infant out of stuffy places.

To avoid the direct hit attention must first be devoted to the mother. If she suffers from chronic suppuration of the upper air passages, it will be difficult, but antenatal nasal hygiene and treatment should be carried out. If she has the misfortune to have an acute catarrh when the baby is born the direct hit may be avoided by instructing her to wear a folded handkerchief over the mouth and nose while "doing" or feeding the baby. My personal experience of the value of this precaution has been most satisfactory, and it should be extended to the maternity nurse and children's nurse. All persons coming to view the infant should be inspected for colds and shut out if a cold is admitted, and always be requested neither to breathe on or kiss the baby.

To avoid the other main method of infection, the germ-laden atmosphere, is an easy matter in an uncrowded house. The infant should either be kept out of doors or in a draught. It is difficult to overcome prejudice in this matter, especially during the daily bath, but it is certain that no infant can come to any harm if efficiently bathed in front of a fire with all the windows open. How often is this rite performed in the complete absence of ventilation, with steam on the windows and in the presence of admiring, but highly infectious grandmothers and aunts.

Thus far for the more fortunate classes, but with overcrowding and housing difficulties among the less well-to-do, we have a more difficult problem. But much may be done, though, if an intelligent mother uses the mask, keeps the baby in a cot under the open window, and keeps it during the day time either out of doors or in her bedroom opposite the open window, as opposed to the stuffy kitchen.

The almost insurmountable difficulty is the parent, nurse, or other children who are what may be termed carriers—i.e., suffer from chronic respiratory catarrh. The position recurs again and again of the catarrhal mother with the catarrhal child, and I am convinced that by far the most potent cause of recurring catarrh, leading to chronic bronchitis and enlargement of the tonsils and adenoids, is infection from some one in the house renewed and re-renewed. It is possible to argue that heredity plays a part, but I do not believe it myself. It is just as frequently caused by an infected nurse. If the parents are infected prophylaxis breaks down. A nurse can be got rid of, but a mother cannot be done away with. Treatment, and the use of the mask, is the only possible method. For the rest, children should be kept away from people with colds and children's parties should be cut down to a minimum and—I want to lay stress on this—kept in a draught. Anyone who has closely observed children will agree that as far as their personal comfort goes, cold does not count.

The treatment of the catarrhal child is the prevention of fresh infection, after affected lymphoid tissue, if present, is removed. The longer that such a child can be kept "free from a cold" the more it will resist the next one. Cod-liver oil is a good stand-by.

THE TOXIC EFFECTS OF LEAD ADMINISTERED INTRAVENOUSLY. By Prof. W. BLAIR BELL, Dr. W. R. WILLIAMS, and Dr. L. CUNNINGHAM.—Owing to a misunderstanding this paper was printed before corrected proofs were received. The errors will be made good in the reprints which the authors will be glad to supply.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF THERAPEUTICS AND PHARMACOLOGY.

A MEETING of this Section was held on Oct. 13th, Dr. GEORGE GRAHAM, the President, being in the chair. He delivered his presidential address on

Some Difficulties in the Use of Insulin,

and began by recalling the enthusiastic welcome accorded to the new discovery of insulin at a similar meeting two years ago. Insulin had shown itself to be a very potent drug, and its use during the succeeding two years had proved to be attended with considerable danger. It was not a cure for diabetes, but so effective a counter-agent that most patients under treatment enjoyed the best of health, and their condition was only betrayed by the food on their tables. Only a comparatively small portion remained invalids and very few died. With the help of some very instructive statistics he analysed a collection of 85 patients who had been treated with insulin at St. Bartholomew's Hospital. These fell into three groups: (1) those he had personally supervised during the last two years; (2) out-patients under the care of his colleagues since January of this year; and (3) earlier patients whose after-history had been followed up. Of these, 17 had died with various symptoms, such as vomiting, pyrexia, blood poisoning, cerebral hæmorrhage, or coma. Some had refused the diet ordered. The deaths mostly occurred outside hospital, and in 12 cases there was evidence of some other disease, such as influenza, which had precipitated the fatal issue. One case, which died in hospital, had been discharged once and subsequently returned. It was fairly certain that she had not taken the prescribed diet at home; when she came back to the ward it was found that her insulin requirement had increased from 10 units to 110. She had no signs of sepsis except a discharge from the ear. She was given 100 units in the course of 15 hours, became comatose, and died after 18 hours. At the post-mortem nothing abnormal was found except that the pancreas was smaller than usual with fewer islets. The staining reactions were not quite normal but seemed to be healthy. It seemed certain that in this case there was a progressive degeneration of the islets of Langerhans which insulin was powerless to prevent; indeed, the injections given precipitated the coma.

Home Treatment.

The two difficulties encountered in treating patients at home after discharge from hospital were the estimation of the blood-sugar and the regulation of diet and insulin dose so as to keep it normal. He believed it best for the patient to maintain the percentage of sugar within normal limits if possible, although he had had cases do well with a persistently high blood-sugar. He aimed at keeping the morning value below 0·13 per cent., but the dosage of insulin required must not cause discomfort to the patient and the sugar should be kept down without insulin as far as possible. The sample of blood for estimation should be taken between 10 and 12 A.M. after an ordinary breakfast, and should not be preceded by any fast or insulin. A blood-sugar which was normal at 10 o'clock had often risen by noon, and the variation gave a rough idea of the patient's power of resistance. A high blood-sugar meant a low resistance. In some cases the blood-sugar would come down without any apparent reason and in others rise equally inexplicably. The usual dose for mild cases was 15–30 units a day, and one dose only should be given if this was possible. If a patient developed a high blood-sugar he should be instructed to raise his morning dose by 2 units at a time until the percentage fell again, but in some cases this increase might cause signs of overdose at

midday without lowering the percentage in the morning sample. Sometimes two small doses instead of one large one overcame the difficulty, and to these patients an evening dose might be given. Some people, indeed, seemed able to take a bigger dose in the evening than in the morning, though usually he advised them to keep the evening dose smaller than the morning one in case hypoglycæmia should occur during the night. The speaker showed the chart of a boy of 9 years of age in whom 4 units produced at first symptoms of overdose. He had pyrexia, and a tuberculous lesion in the larynx was discovered. It was probable that he had a subacute infection of the lungs also. He was discharged from hospital in January with the blood-sugar normal. In October the blood-sugar rose and the insulin was proportionately increased. In the following January it rose again, but a further increase in the morning dose of insulin produced no effect. When, however, the evening dose was increased the percentage was controlled, and after ten months the child was still doing well. He was now having 6 units in the morning and 8 in the evening, and his diet represented 1705 calories (carbohydrate, 25; protein, 94; fat, 130). Possibly the evening dose was required to counteract the pyrexia, which tended to raise the blood-sugar.

Spacing of Doses.

Two patients under his care showed symptoms of overdose every time their insulin was increased. One woman was having an interval of only eight hours between doses, another of nine hours. The symptoms in both cases disappeared on increasing the interval to 11 and 13 hours respectively, and it was then possible to increase the insulin dosage. Patients should be warned against the danger of hypoglycæmia, but it had only occurred in two of his cases, one of whom became unconscious and the other hemiplegic. Both recovered when sugar was given, and after that it was found that the insulin requirement had decreased.

Infections.

Minor infections had the effect of raising the blood-sugar. His present practice was to increase the dose by 1 to 3 units directly a minor infection, such as a cold in the head, showed itself. It was too soon as yet to report the results of this method. Sometimes such infections were followed by a drop in the insulin requirement. When a major infection occurred the insulin dose should be increased immediately and courageously. Sometimes a patient who had been receiving 20 units might have to be raised to 200. The urine should be collected every three hours and tested for sugar, the large dose being continued until the sugar content dropped. Then the insulin was immediately stopped and none given until the sugar in the urine began to rise again. The danger came with convalescence, as hypoglycæmia was liable to supervene when the temperature dropped. Sugar must be kept ready for such an emergency.

Relation between Insulin and Exercise.

Dr. R. D. LAWRENCE spoke of the very marked effect of exercise in decreasing the blood-sugar, which was especially noticeable in people who constantly alternated between sedentary and active pursuits. Hard exercise might produce severe hypoglycæmia. He mentioned the case of a gardener whose diet had been constant for 18 months. Last winter his regular insulin dose was 10 units in the morning and 6 in the evening, which kept a good balance, his blood-sugar falling to 0·1 four hours after the dose. About May he started to work very much harder and also took up cricket; after one week he suffered from dizziness caused by hypoglycæmia, and in July he was keeping a good balance with 6 units once a day. At the end of that month he stopped work and cricket and his blood-sugar went up. He restored his balance with 8 units in the morning and 5 at night. Following medical advice he returned to work and found that 5 units daily were then sufficient. He now carried out urine tests nearly every day and had learned to adjust his own insulin to correspond with his activities. Another patient of sedentary habits, who had been receiving 16 units in the morning and 12 at night, suffered from hypoglycæmia two or three hours after his Sunday tennis if he had more than 10 units in the morning; 8 kept him in good condition. He went on a vigorous holiday, and for three weeks was able to double his carbohydrate intake on the same insulin dose without passing sugar. He even suffered from hypoglycæmia if he took exercise before meals. This exercise factor would account for the apparent improvement of patients on their discharge from hospital and return to active life.

Dr. Lawrence showed a very interesting chart illustrating the effect of intensive exercise on the blood-sugar after a measured meal compared with the blood-sugar if no exercise were taken. Diets were more difficult to alter, however, than insulin doses. His practice was to teach the patients to treat themselves by diet as far as possible and to increase the insulin dose, when this became unavoidable, by 2 units morning and night. All his cases had returned to normal life and on the whole were taking less insulin than Dr. Graham's, the average being 15 units in the morning and 10 at night. Some, especially coma cases who had recovered, started on 25 in the morning and 20 at night. The uniform diet he used tended to produce a uniform insulin requirement. He had had no cases of infection in the patients who were attending regularly, except for colds in the head and influenza, which had only produced glycosuria in one case.

Dr. E. P. POULTON showed an interesting chart made by a patient himself showing blood-sugar variations and Rotherer reactions side by side, the latter giving a more sensitive indication of his condition. He thought that mild cases did better with small doses of insulin combined with dieting than with dietetic measures alone. He quoted the case of a medical man who had had diabetes since 1906. His attacks of giddiness increased in severity in 1922, and he entered hospital and found that small doses of insulin made a great difference to him. After a month the insulin was dropped and the improvement was maintained without it. In very wasted patients insulin was dangerous without carbohydrate. He had had the same experience as Dr. Lawrence that the insulin requirement of patients tended to settle to a common level.

Dr. C. H. BEST (Toronto) said that the problems encountered in the birthplace of insulin were just the same as those of this country. Out-patients who attended regularly did very well, but the irregular ones caused difficulty, so much so that a special social service department had been organised at the Toronto General Hospital to keep in touch with these cases. He agreed with the President on the danger of infection and regarded it as the greatest bugbear of the clinician. There seemed no solution of the problem except early recognition and counter-action by an increased dose of insulin or modification of the diet. The path of those who did not contract infections was smooth. The first person ever to receive a dose of insulin, a lad named Leonard Thompson, was now a healthy young man. Dr. Lawrence's experiences were just what he would have expected.

Insulin in Children.

Dr. G. A. HARRISON spoke of the special difficulties of treating diabetic children. Since it was essential to give a diet of sufficient calories to permit growth the food intake had to be large. The difficulty was, therefore, to keep pace with these comparatively rich diets without giving too much insulin. Several American writers maintained that one injection daily was sufficient unless the dose exceeded 10 units, when it had better be divided into two or more. In several cases where large doses were necessary three or four doses were given daily before meals, and another at

midnight. The multiplication of doses, however, was extremely bad for children, partly because of the hardening effect on the skin and partly because of the alarm caused to the child by the whole process of injection. In fact, parents were often unable to give the insulin for this reason. The maximum number should therefore be reduced to two if possible, but severe cases tended to show a rise in the blood-sugar after a night's rest. With careful spacing of meals, however, and a 10- or 12-hour interval between doses the blood-sugar could often be kept down. Parents should be told to supervise the exercise of the children in order to prevent a sudden drop in blood-sugar from this cause. In children intercurrent sepsis was liable to be very sudden and serious. The prescribed diet was very difficult to give when the child was sickening for some infection and the doctor, hearing that all the food was not being taken, was liable to fear hypoglycæmia and reduce the insulin. Unless he could test the blood-sugar often it was difficult to recognise the true cause of the anorexia. Insulin should never be stopped entirely, even if no food were being taken at all, as a patient suffering from an acute illness might have a large carbohydrate store. The family doctor must strike a balance between the factors of increased requirement and decreased tolerance. It was far better to send the child to a nursing home, but in the interval he might as a general rule substitute milk for the prescribed diet, as it was the only food most sick children would take. If the normal dose of insulin were 10 units it should be reduced to 5; if over 10, then two-thirds of the usual dose should be given. Sugar should be kept handy, but insulin should never be given at the same time as glucose. After 24 hours, when the glycogen stores were depleted, a little might be given. The hypoglycæmic reactions of children were not so marked as those of adults; often an attack started with fretfulness and then the child became quiet and pale. It was naturally extremely difficult to distinguish these signs from those of pyrexia. He summarised the difficulties as inverse to the facilities for blood-sugar estimations.

High Blood-sugar a Mendelian Recessive.

Dr. P. J. CAMMIDGE remarked that it seemed to be assumed that all forms of diabetes were essentially the same. In his opinion there was a vital difference between the adult and the childish form. Juvenile diabetes had a distinct ætiology and origin. He had recently undertaken some research which would indicate that a constitutional high blood-sugar was a Mendelian recessive character. An animal with high blood-sugar produced a normal progeny, but the offspring of these showed a Mendelian proportion of individuals with high blood-sugar. Mice illustrated this principle very clearly and probably other animals would also. If it was, as he believed, a true Mendelian recessive it would almost certainly appear in man as well. He had come to the conclusion that there was no such thing as a normal blood-sugar, but that individuals varied between wide limits. Low blood-sugar might also be recessive, but the experiments on this were not yet complete. The theoretical reason for these results lay in the interaction of the endocrine secretions. Definite chemical experiments had proved that insulin and adrenalin had opposite effects upon the activity of certain glycogen ferments. Insulin and pituitary extract, on the other hand, did not have opposite effects but chemically neutralised one another. Excessive doses of insulin therefore tended to exhaust the pituitary and set up diabetes insipidus in a mild form. Another influence in elderly diabetics was hyperthyroidism. There was no activity between thyroid and insulin, but the thyroid activated the adrenalin which opposed the insulin. If the thyroid were diminished by diet and treatment signs of overdose of insulin tended to appear.

A great deal of difficulty arose from always doing tolerance tests with sugar. It was rapid and easy, but people ate other things besides sugar, and much truer results were obtained from testing after an ordinary mixed meal. Another source of error was the practice of giving insulin half an hour before a meal and making the tolerance test three-quarters of an hour after. By this method the maximum of insulin reaction was reached considerably before the maximum food reaction, especially in hypothyroidic patients. If the insulin were given earlier, say an hour or an hour and a half before the meal, the maxima would be more likely to coincide.

NEWCASTLE-UPON-TYNE AND NORTHERN COUNTIES MEDICAL SOCIETY.

THE first meeting of the session was held in the Royal Victoria Infirmary, Newcastle, on Oct. 8th, when Dr. NEIL MACLAY delivered his inaugural presidential address on

Modernism in Medicine.

As an observer of medical life for 30 years he had been able to view it from two different standpoints. First as a general practitioner, and later from the somewhat narrower sphere of a specialist. This had been a period of great changes and advances in medicine, but nevertheless there were disquieting signs of retrogression. On all sides there was a steady growth of superstition, both in religion and medicine, and an inclination on the part of the public towards quackery. Dr. Maclay went on to deal with the part which medical men might play in combating these influences. The crowded curriculum of the student intensified the difficulties. As a result newly qualified men seemed to be now less able to judge what was commercial quackery and what scientific truth.

Exhibition of Clinical Cases.

Mr. J. S. ARKLE showed various ophthalmic cases, the chief of which were (1) a recent extensive hæmorrhage into the vitreous in a woman of 24, seven months pregnant; (2) ruptured choroid following concussion; (3) a severe neuro-retinitis with well-marked "star" figure at the macules, in a patient without any obvious cause.

Mr. JOHN CLAY showed a man, aged 36, from whom he had removed an astragalus 16 years earlier after an injury. Since then the man had been able to serve as an infantryman in the Army and pursue heavy work regularly.

Dr. HORSLEY DRUMMOND showed a case of aortic aneurysm with dislocation of the inner end of the clavicle; also cases of mediastinal tumour and sub-acute combined degeneration of the cord.

Dr. H. E. GAMLEN demonstrated various radiological films.

Dr. W. E. HUME showed a case of erythræmia in a man of 48, where the symptoms had started six months earlier with hæmoptysis; also cases of crossed paralysis from pontine softening and auricular fibrillation treated with quinidine sulphate.

Mr. C. G. IRWIN showed a case of extensive syphilitic osteitis of the skull which appeared in spite of previous antisyphilitic treatment.

Dr. F. J. NATTRASS: A case of myasthenia gravis; a woman of 26 with weakness of palate and external ophthalmoplegia.

Dr. A. PARKIN: A case of tuberculous spine with pressure myelitis in a child, and cases of different types of aneurysms.

Mr. F. C. PYBUS: A case of trigeminal neuralgia successfully treated by operation; also cases of axillary aneurysm and congenital dislocation of the hip.

Mr. R. J. WILLAN demonstrated a group of cases with pyelographic records which illustrated the value of pyelograms in localising and differentiating kidney lesions. These were congenital cystic kidneys in an adult woman; a woman with right-sided pyonephrosis; a case of left-sided hydronephrotic kidney.

Reviews and Notices of Books.

TEXT-BOOKS OF MEDICINE.

Taylor's Practice of Medicine. Thirteenth edition. By E. P. POULTON, M.D. Oxon., F.R.C.P. Lond., Physician to Guy's Hospital; formerly Radcliffe Travelling Fellow and Beit Memorial Research Fellow. With the assistance of C. PUTNAM SYMONDS, M.D. Oxon., F.R.C.P. Lond., Assistant Physician for Nervous Diseases, Guy's Hospital; formerly Radcliffe Travelling Fellow; and H. W. BARBER, M.B. Camb., F.R.C.P. Lond., Physician-in-Charge of Skin Department, Guy's Hospital. London: J. and A. Churchill. 1925. With 48 plates (8 coloured) and 93 text-figures. Pp. 1063. 28*s*.

Dr. E. P. Poulton has again produced a revised edition of the late Sir Frederick Taylor's famous text-book. The extent of revision rendered necessary by the advances of medical science may be gathered from the fact that new articles have been added dealing with meliodosis, tularæmia, ectoscopy, manganese poisoning, Mönckeberg's degeneration, the recent work on the ætiology of cancer, and half a dozen other subjects, whilst the authors have had to rewrite or largely revise their previous articles on anaphylaxis, jaundice, pernicious anæmia, the spleen, cerebro-spinal fluid, epilepsy, and many other equally important topics. In addition to these revisions and amplifications, there are several new features which call for special comment. In the first place, Dr. Poulton has seen fit to introduce at the end of each section a list of important references, with numbers corresponding to places in the text. In this manner he has not only eliminated from the text many unnecessary quotations, but he has provided for his readers a selected bibliography most useful as a guide to further reading at a time when medical literature has become so ponderous. The illustrations too in the new volume have undergone considerable improvement. A generous provision of radiograms enables the student to make a proper study of this increasingly important aid to diagnosis. The eight new coloured plates include excellent illustrations of normal and abnormal leucocytes. It is perhaps open to question whether the plate of nucleated red cells facing p. 520 is of sufficiently common interest to merit inclusion. If so, it requires more detailed explanation than is at present to be found in the text.

A survey of the text confirms a previous impression of accurate and scholarly writing. Those who are not reading the book from cover to cover would do well to turn to Dr. Poulton's articles on asthma, diabetes, pernicious anæmia, and peptic ulcer. Laboratory tests are given their proper place, although it is curious to see so little stress laid on frequent measurement of the specific gravity of the urine as an index of renal efficiency. Yvon's method of estimating blood-urea is given preference to the more useful analytical methods of Folin. The section dealing with diseases of the central nervous system has again been written by Dr. C. Putnam Symonds, who has revised or rewritten the articles dealing with examination of the cerebro-spinal fluid, neuritis, cerebral diplegia, epilepsy, and several others. New and excellent photographs illustrate the topical diagnosis of lesions of the cord by means of lipiodol injections. The section, while it contains only what is necessary for the use of students and practitioners, achieves a high standard. The full description of rheumatic chorea included in this section might with advantage be transferred to the chapter on rheumatic fever. Dr. H. W. Barber once more deals with the diseases of the skin, and this section, too, is now enriched with coloured illustrations to its countless benefit. This section of the book has always been well done as far as that was possible without pictorial help. The illustration of psoriasis facing p. 939 might be improved. Dr. Barber has adopted the classification of Dr. Darier, to whose famous book he acknowledges his indebtedness, but the section as it stands bears the stamp of Dr. Barber's own extensive experience and learning.

To have accomplished all this within three years of the previous edition is a tribute not only to the learning and industry of Dr. Poulton and his collaborators, but also to the deserved popularity of the work among students and practitioners.

A System of Clinical Medicine. Seventh edition. By THOMAS DIXON SAVILL, M.D. Lond. London: Edward Arnold and Co. 1925. Pp. 1004. 28*s*.

THIS carefully planned text-book dealing with disease from the standpoint of symptomatology was first published over 20 years ago, and may now be said to have established its position as a modern classic. Since Dr. Savill's death in 1910, just after the publication of the second edition, the task of keeping the subsequent issues up to date has been ably performed by his widow, Dr. Agnes Savill. The seventh edition has in considerable part been rewritten and fully revised, though in bulk the volume has increased by some 50 pages only; for assistance in this labour Dr. Agnes Savill expresses her indebtedness to Dr. Harry Campbell, Dr. J. Strickland Goodall (Diseases of the Heart), Dr. J. D. Rolleston (Fevers), Dr. S. W. Patterson (Diseases of the Stomach and Liver), Dr. Angus MacGillivray (Diseases of the Eye), Dr. Robert Cole (Mental Diseases), Sir James Dundas-Grant (Diseases of Ear), Mr. Philip Franklin (Diseases of Nose and Throat), Colonel W. S. Byam (Tropical Diseases), Prof. Louise McIlroy (Diseases of Women), Dr. Skene Keith (Immunity), Dr. Leonard Williams (Thyroid Gland), Dr. Langdon Brown (Diabetes Mellitus), Dr. Gordon Ward (Diseases of Blood and Spleen), and Dr. V. E. Sorapure (Basal Metabolism and Animal Measurement). Dr. Thomas Savill's plan of designing a text-book of medicine "from the patient's point of view," was no simple matter to carry into effect, but there can be little doubt that his ambition has been fulfilled, nor is anything neglected in the way of ætiology, pathology, and treatment to make the work complete. Important diseases are indicated by the use of large type, rarities are described in smaller type, and abundant cross references are given to avoid repetition and increase the utility of the book. We can with increasing confidence recommend for the seventh time "Savill's Medicine" to senior students and practitioners on the look-out for a sound summary of clinical diagnosis.

The Principles and Practice of Medicine. By the late Sir WILLIAM OSLER, Bt., M.D., F.R.C.P. Lond., F.R.S. Tenth edition, thoroughly revised by THOMAS MCCRAE, M.D., F.R.C.P. Lond., Professor of Medicine, Jefferson Medical College, Philadelphia. London and New York: D. Appleton and Company. 1925. Pp. 1234–xxxxi. 30*s*.

"The Principles and Practice of Medicine" first appeared over 33 years ago, and those who have read the biography of Sir William Osler by Harvey Cushing will have noted the large part which this text-book took in Osler's life. The value of the book is so well known and universally recognised that it requires no further commendation on our part; in the tenth edition, which has been thoroughly revised by Prof. McCrae, a constant effort has been made to retain the features characteristic of its author, who "felt that a text-book should contain well-established knowledge and not every new wind of doctrine." Since the previous edition which passed through Prof. McCrae's hands there has been a complete resetting of the book, and many subjects which are new or the discussion of which is altered have now been incorporated, among them scarlet fever, car and sea sickness, carbon monoxide poisoning, epidemic diaphragmatic pleurodynia, many tropical and local diseases, hypotension and hypertension, and so forth. Additions have been made throughout to the sections on symptoms and signs, diagnosis and treat-

ment, the aim being to include material which is of established value. This edition will not only maintain but enhance the reputation of its predecessors.

A Synopsis of Medicine. Fourth edition. By H. LETHEBY TIDY, M.D., B.Ch. Oxf., F.R.C.P. Lond., Assistant Physician to St. Thomas's Hospital; Physician to the Royal Northern Hospital. Bristol: John Wright and Sons, Ltd. 1925. Pp. 1000. 21*s.*

THIS synopsis was first published in 1920, and the measure of its success may be gauged by the present appearance of the fourth edition, revised and enlarged. The most extensive alterations are in the chapters on diabetes, and have been necessitated by the rapid advance of knowledge since the discovery and use of insulin. The article on jaundice has also been rewritten, and is based on the views of MacNee. Other articles which have been entirely, or almost entirely, rewritten include botulism, visceroptosis, hæmatoporphyrinuria, infarction of the lung, primary purpura, and acholuric jaundice. Considerable alterations have been made in the chapters on gall-stones and bronchial asthma, while that on splenic anæmia has been recast. New chapters have been added on blood diseases of childhood and on thrombosis and embolism. The object of this précis of medicine is to assist those who have to revise rapidly their knowledge of medicine in general or of some disease in particular—the worried student, the general practitioner, or possibly even the teacher—and Dr. Tidy's painstaking work, in fulfilling this purpose, has met with the success which it deserves.

CLINICAL FEATURES OF HEART DISEASE.

An Interpretation of the Mechanics of Diagnosis for Practitioners. By LEROY CRUMMER, M.D., Professor of Medicine, University of Nebraska. New York: Paul Hoeber. London: Henry Kimpton. 1925. Pp. 353. 12*s.* 6*d.*

THE introduction of new methods in diagnosis may temporarily upset the sense of perspective, but in the course of time such methods find their level, which is generally to supplement rather than to replace those which have been previously in vogue. The cardiologist of to-day is fully prepared to admit the extent of his debt to the work and teaching of the great clinicians of the past. Many of their doctrines have stood the test of time, while others have had to be discarded in the light of more recent knowledge; but to restate those doctrines more clearly or more convincingly than they have been stated by the writers of past generations is no easy matter. As his text Dr. Crummer takes a concisely worded document prepared by the American War Department in 1917 for the guidance of medical officers employed in the examination of recruits. He deals in turn with the various important facts which may be elicited in taking the history of a cardiac case, with the different methods of physical examination, with valvular disease, and with other branches of the subject. His views on the components of the first heart sound arising in the right and left ventricles respectively are interesting; but apart from this he adds little to what has been written before. Some of the terms employed, such as the "onward" murmur, are unfamiliar to the English reader. The author appears to take an unduly pessimistic view of the clinical powers of the modern physician when he says that "Even when . . . . obtained or corrected by the most experienced members of the staff . . . . the history is quite apt to be absolutely worthless," or again, that "the discovery of albumin in the urine no matter what the source is called Bright's disease." In the treatment of auricular fibrillation he expresses the opinion that "a sudden reduction in heart-rate to 80 or below indicates overdosage with digitalis." This is overcautious. In a book of this size it is not possible to discuss the evidence on which statements of opinion are based, and the impression is left that the author has attempted to cover too wide a field.

SURGERY.

Some Encouragements in Cancer Surgery. By G. GREY TURNER, F.R.C.S., Surgeon to the Royal Infirmary, Newcastle-upon-Tyne. Bristol: John Wright and Sons. 1925. Pp. 75. 7*s.* 6*d.*

THIS is an account of a wonderful series of patients with advanced cancer who have been operated upon by the author and who have lived for many years without recurrence or have died only after a long respite of apparent health. As was to be expected, these gratifying results have been obtained more particularly in certain types of growth, or in cancer in certain situations. It is strikingly brought out how successful operative treatment may be in carcinoma coli, and a very remarkable case is the complete cure of a man with a chondrosarcoma of the tibia. There is a certain excuse for the gloomy outlook which prevails in the minds of many surgeons with regard to the operative treatment of malignant disease, but no one could fail to be spurred to increased efforts along recognised surgical lines by reading this book. Mr. Grey Turner has done a great service in recording these results.

Chirurgische Operationslehre. Fourth edition. By Prof. Dr. FRIEDRICH PELS LEUSDEN. Berlin: Urban and Schwarzenberg. 1925. Pp. 832. M.18.

THIS well-known text-book has an established position which it is likely to retain, for it has been brought thoroughly up to date. It is a rather larger book than the average English student reads, as it is very comprehensive. Many operations which have very seldom been done are described. This is one of the features which add to its value, as also the fact that minor surgical operations are not neglected. It reflects, of course, German teaching; but this does not make it very different from the usual English text-book, for surgical practice all over the world tends increasingly to conform to a single standard. The book can be recommended.

THE EVOLUTION OF ANATOMY.

A Short History of Anatomical and Physiological Discovery to Harvey. Being the substance of the FitzPatrick Lectures delivered at the Royal College of Physicians of London in the years 1923 and 1924. By CHARLES SINGER, M.A., M.D., F.R.C.P. London: Kegan Paul, Trench, Trübner and Co., Ltd. 1925. Pp. 209. 12*s.* 6*d.*

Dr. Singer in his two courses of lectures has set forth in a pleasing and scholarly manner the growth of anatomical, and to some extent of physiological, knowledge. He begins with allusions to the dawn of anatomical ideas as exemplified in drawings of animals from the Magdalenian caves and by a model of an arm from Knossos, and then passes in rapid review such knowledge of anatomy as was exhibited by Assyrians, Egyptians, Greeks, and Romans. He includes the great poem of Lucretius under the head of Latin anatomical literature, but we cannot agree in his dictum that "as an observer he (Lucretius) is negligible." Of course, he occasionally made gross mistakes, but his observation of ordinary natural phenomena was singularly acute, a fact which every commentator has noticed. In his section upon mediæval anatomy Dr. Singer refers to a drawing in an MS. of Guy de Vigevano preserved in the Musée Condé at Chantilly, representing a dissection, and remarks: "The relation of the dissector to the subject in this and other miniatures of the same MS. shows that the body was suspended." Dr. E. Wickersheimer, however, in his paper on the same MS., published in the *Archiv für Geschichte der Medizin*, 1913, considers that the upright position was a traditional method of representation and probably originated from the fact that in this position it was far more easy to show the action of the surgeon in making incisions. Almost the

entire latter half of the book is devoted to Vesalius and Harvey, whose researches are described with a simple clarity worthy of imitation by other writers who may feel inclined to discuss similar matters. Dr. Singer concludes by reminding his readers that William Sharpey, the first holder of the first chair of physiology established in England, was himself a student of Padua.

A TEXT-BOOK OF OARSMANSHIP.

By GILBERT C. BOURNE, Secretary of the Oxford University Boat Club, 1884 and 1885. Oxford University Press. 1925. Pp. 376. 18s.

THE author has carried for so many years a name of such weight among those who are experts in rowing, judges of its art, and instructors of famous crews, that his considered opinions, after 40 years' experience of Oxford oarsmanship, are entitled to respect. This work began as an essay written in undergraduate days; the author was firmly established in correct principles by the celebrated Dr. Warre while at Eton, so that the book contains the conclusions of a lifetime's study of the subject. It deals in order with the theory of rowing, the art of rowing, oars and boats, coaching, and muscular action in rowing. It is with the last of these sections that we are called upon to deal particularly. These chapters do not pretend to be written for the anatomist, but they seem to be admirably suited to the purpose the author has in view. An intelligent oarsman, especially if supervised by a coach who has good knowledge of and belief in the value of the subject, ought to find these anatomical details of great use to him in his effort to understand how the greatest amount of work may be got with the least expenditure of effort. The short accounts of muscles and their actions are correct and excellent, and sufficiently full to present a picture, while the figures in the text are clear and good; it may be pointed out that the coraco-brachialis is wrongly labelled in Fig. 48. Attention should, however, be called to the common but mistaken notion that the humerus and scapula move at different times when the arm is raised above the head, for the swing forward is essentially an act of raising the arms above and in front of the head. The analysis of the act of raising the arm, recognising the necessity of fixing the scapula, thereafter speaks of the raising of the humerus on the fixed bone, and of the amount of upward raising made possible by the additional rotation of the scapula; but it must be understood that the two motions are not consecutive but concurrent. The scapula begins to move at the same time as the humerus, although more slowly, and its movement continues throughout the greater part of the raising of the arm. In other words, the scapula is overfixed from the beginning, affording in this way a point d'appui for the action of the humerus. In this complex the trapezius acts alone at first and the serratus magnus comes in automatically at a certain point; it cannot be brought in before this, and the trapezius cannot by itself manage the whole affair. The lower fibres of the trapezius are mainly concerned, the middle fibres coming in toward the end of the movement to give the final touch to the scapular action. The upper fibres have little to do beyond giving active support, and it seems not improbable that the contracted condition of these fibres observed at the end of the forward swing, in overreaching, or even in turning the oar off the feather, may be really associated with an effort to lift up the head. We have laid some stress on this because an appreciation of its bearing may lead to modification of some of the theoretical views advanced by the author when dealing with the movements concerned; but it is naturally impossible to be sure of what does take place, exactly and fully, and in practice it probably matters little whether the teacher makes use of the correct description or the correct but misleading analysis. We confess to some doubt about the action of the gluteus maximus, at any rate in the first part of the stroke, but this, again, is of secondary importance, and the chapters on muscular action may be commended for their clearness and practical value.

The rest of the book is of the same high level in exposition and is illustrated by clear and useful diagrams and drawings. The work is, in fact, most interesting; to anyone who has ever handled an oar, however incompetently, it is fascinating. The whole production is of that excellence which we are accustomed to associate with the Oxford Press.

JOURNALS.

JOURNAL OF INDUSTRIAL HYGIENE. August, 1925. —W. I. Clark and E. B. Simmons describe their own observations over a period of 11 years upon the dust risk in the abrasive industry, where such artificial abrasives as aluminium oxide (emery) and silicon carbide (carborundum) are made and handled. Results of clinical and X ray examinations are given, together with a statement of the occurrence of pulmonary tuberculosis. The conclusion is arrived at that inhalation of these dusts does not lead to fibrosis, and that the use of artificial abrasive wheels, instead of sandstone wheels, reduces the risk of pneumonoconioses for grinders to an enormous extent. The negative evidence against emery and carborundum here given is of particular importance.—P. K. Thomson reports upon investigation into whether small amounts of zinc from biologic material ashed by the incineration process can be recovered. The volatility of zinc suggested there was considerable risk of losing the metal during incineration. A series of experiments made are carefully described, and the author found that even small amounts of zinc can be easily and safely detected after biologic material has been ashed at 450° C.—A new hazard in industry is reported by W. B. Castle, K. R. Drinker, and C. K. Drinker as occurring among workers employed in applying a luminous paint containing radium. Five cases of necrosis of the jaw were discovered. The necrosis was a chronic progressive condition closely resembling that resulting from phosphorus poisoning. There were opportunities for the paint to be smeared on the fingers and so absorbed through the skin, or even swallowed through the practice of pointing paint brushes in the mouth; but the inhalation of dust presented another source of risk. The luminosity of the material enabled its deposition as dust on chairs, tables, clothes, and even on the skins of the workers to be easily demonstrated. The reporters, although not considering their investigation absolutely conclusive, state their opinion that the necrosis is due to the radium paint. Blood examinations demonstrated an over-exposure to radium. Radium is deposited in bone, and literature presents cases of jaw necrosis among those who have received radium treatment for mouth cancers. This paper is clearly of interest to those using radium for remedial purposes. —— September: A method for sampling dust in alveolar air is reported by R. M. Thomson, who shows that such dust can be sampled directly by using Owen's jet dust counter, Kotze's konimeter, or Hill's dust counter, in conjunction with Haldane's alveolar air sampler. Analyses of exhaled air justify the assumption that samples of true alveolar dust are obtained by this method. A description of experiments in sampling alveolar dust is given, illustrated by photomicrographs. The method possesses a broad field of usefulness in studying the actual particles reaching the lungs of persons engaged in dusty trades, and it is apparently adaptable for use in analysing problems of bacterial inhalation in infected atmospheres.—A long and important article appears by M. Oppenheim on the statistics, definition, and clinical aspects of occupational dermatitis. This capable summary, based on Prof. Oppenheim's work over many years at Vienna, cannot fail to be of great interest to industrial physicians. It is, however, a summary, and its contents cannot be shortly exposed.

Reports and Analytical Records.

(1) "TABLOID" DIGITALIS LEAF (1 GR.); (2) "TABLOID" IODICIN (0·03 G.).

(BURROUGHS WELLCOME AND CO., SNOW HILL BUILDINGS, LONDON, E.C. 1.)

(1) The administration of dried digitalis leaves in cases of organic cardiac disease is credited with physiological results of a uniform character. But there has been uncertainty as to the glucosidal content of the leaves which varies with the kind of seed, the method of collection and drying, and, of course, with the accurate physiological control of the finished drug. A welcome will therefore be extended to a 1 gr. product of digitalis leaf under the "Tabloid" brand. The cultivation of the digitalis has taken place at the "Wellcome" Materia Medica Farm at Dartford, where pains have been taken that the seed should be of the correct variety, and that the leaves are gathered and dried in the correct manner. Finally, the drug has been subjected to physiological control by the laboratories of the firm. The tabloids are issued in bottles of 25 and 100.

(2) "Tabloid" Iodicin (0·03 g.) (with chocolate base) provides a means for the prolonged administration of iodine to children. It is palatable and odourless, the chocolate base being designed to make the product acceptable to young patients. Its medicinal constituent, Iodicin, a calcium salt of iodoricinoleic acid, contains a high percentage of iodine in organic combination. One "Tabloid" Iodicin, 0·03 g., secures the administration of 0·01 g. (approximately ⅙ gr.) of iodine. Iodicin is unaffected by the gastric juice and is absorbed only after passing into the duodenum. It is particularly suitable for prolonged administration as it does not cause digestive disturbance or iodism. It is issued in bottles of 25 and 100. The suggested prophylactic dose is one "Tabloid" product weekly, the curative dose from two to three products weekly up to one daily for 30 days. The drug meets the need arising out of the well-known Austrian and Swiss experiences in respect of goitre, which have been confirmed both in the United States and New Zealand.

(1) AGAROL BRAND COMPOUND (WARNER); (2) IDOSAL.

(FRANCIS NEWBERY AND SON, LTD., 31-33, BANNER-STREET, LONDON, E.C. 1.)

(1) Agarol Brand Compound is a preparation of modified mineral oil with phenolphthalein and agar-agar. It is a homogeneous emulsion free from alkalies and sugar, and evidence is forthcoming that it acts as the named constituents suggest that it should. Thus it is a lubricant mixing with waste matter, rendering it soft and adding to its bulk, a normal bowel activity being in this way aided. The preparation is manufactured by Messrs. William R. Warner and Co. in New York.

(2) Idosal is a combination of the iodide and chloride of sodium, carbonate of magnesia, and phosphate of calcium, and has been recommended by medical men as a useful method of administering iodine in an assimilable form. Its description as a "supertonic table salt" is correct, but a warning is properly added upon the bottle that it should only be used as an ordinary table salt in moderation. The active ingredient is a prophylactic against goitre and useful in hypothyroidism, and having a definite iodine content can be recommended for therapeutic use. We noticed recently another preparation with similar claims to value in the treatment of goitre, and refer readers to an annotation which appeared in THE LANCET of Sept. 19th, p. 615. The successful results obtained in different parts of the world in the treatment of endemic goitre by means of iodine are there recorded, though the ætiology of the disease has not been made as clear as the treatment.

(1) DOUBLE CREAM SOYA MILK AND YEAST; (2) SOYA MILK (SYNTHETIC MILK IN POWDER FORM) DOUBLE CREAM (UNSWEETENED).

(THE GARDEN CITY PURE FOOD CO., LTD., LETCHWORTH, HERTS.)

(1) *Double Cream Soya Milk and Yeast.*—This yellowish brown powder mixes with water in all proportions. It has a slightly saline and distinctly "meaty" flavour. On analysis the preparation was found to have the following composition:—

Moisture	2·00 per cent.
Ash	8·38 ,,
Fat	56·70 ,,
Protein	16·80 ,,
Nitrogen-free extract	16·12 ,,
Calorie value per lb.	2858

Starch, cane-sugar, and reducing sugars were absent.

This material contains an unusually large percentage of fat and this, in conjunction with the protein, accounts for the high caloric value. The entire absence of starch and sugars, the ready miscibility with water (when a whisk is used), the high fat content, and the "meaty" flavour go to show that in this product the makers have furnished a valuable and highly nutritious addition to the limited dietary suitable for the use of diabetic patients.

(2) *Soya Milk (Synthetic Milk in Powder Form) Double Cream (Unsweetened).*—This is a yellowish powder, which, when mixed with water, produces a fluid very closely resembling a rich milk in appearance and flavour. When analysed the following figures were obtained:—

Water	2·24 per cent.
Ash	6·06 ,,
Fat	66·00 ,,
Protein	12·25 ,,
Nitrogen free extract	13·45 ,,
Calorie value per lb.	3139

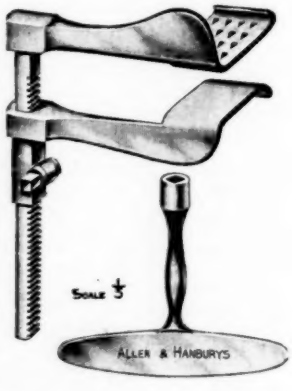
Starch, cane-sugar, and reducing sugars were absent.

For the purposes of comparison it may be noted that ordinary dried milk contains 25–27 per cent. of fat. The claim of the manufacturers that this milk may be valuable to persons suffering from diabetes is substantiated by the analytical data.

New Inventions.

A MODIFIED TUFFIER'S THORACOTOMY RETRACTOR.

AFTER using Tuffier's thoracotomy retractor for several lung cases, I found the instrument was often unsatisfactory. The retraction obtainable by this instrument is usually inadequate owing to the difficulty in opening the blades by means of the thumb screw, attempts to do this often resulting in torn gloves. De Quervain's retractor, although mechanically efficient—retraction being controlled by means of a ratchet or cross handle—I find too unwieldy for general use. I have therefore had made a modification of Tuffier's retractor fitted with a powerful ratchet screw, which is operated by a removable T-shaped key (see illustration). This instrument has the advantage of being small and yet sufficiently powerful to give good retraction. Furthermore, the key can be removed and does not hamper the operator. Messrs. Allen and Hanburys, of Wigmore-street, are the makers.



CECIL P. G. WAKELEY, F.R.C.S. Eng.

THE LANCET.

LONDON: SATURDAY, OCTOBER 24, 1925.

NON-UNION IN FRACTURES.

THE factors influencing the normal growth of bone are as yet imperfectly known; still less reliable knowledge have we of processes essential for the union of the fracture of an adult bone. That general metabolic derangement has a potent influence, the existence of bone changes in acromegaly and other diseases shows. It is therefore not surprising that unfavourable conditions of general health have always been held to cause delay in the healing of fractures. But in numerous cases of hindered union this factor can be definitely excluded. The cause seems to be a local one.

A fortnight ago we published a lecture by Prof. E. W. HEY GROVES, who reviewed such causes, voiced his own opinions, and gave advice as to treatment. He believes that one important cause of delayed union is unrestricted mobility, and he makes a very important distinction between two forms of non-union. In the one the unifying process seems simply in abeyance; the bone-ends, in X ray plates and if cut down upon, appear just to have remained unaltered from the time of the accident, whilst in the other there has been much activity of the bone-ends which have become sclerosed and eburnated, give a darker shadow with X rays, and are joined by dense fibrous tissue. The first variety will often yield to non-operative measures, whilst the second calls for them. Prof. GROVES insists that proper fixation is essential for union to take place. On this point Mr. J. W. DOWDEN joins issue with him in a letter appearing elsewhere in this issue. In an experience of 25 years he has but once met a fracture which would not unite, and that was of the clavicle, a result he attributes to having adopted the principle of mobility in the treatment of fractures. It does not seem likely that union would be favoured by free movements of the bone-ends on one another, a movement which would break down the adhesions between the opposing layers of granulation tissue. A laparotomy wound would certainly not heal if constantly dragged open. The granulation tissue bond must quite obviously remain intact for union to take place. This does not prohibit movements of surrounding muscles and neighbouring joints, and even a non-destructive bending of the granulation tissue junction at the site of fracture. Such movements improve the local circulation, empty the clogged lymphatics, and generally promote the healing process. Limited movements have proved their worth in the treatment of fractures. There is probably no real conflict of opinion on the subject of mobility, for the one surgeon advocates fixation of the fragments with movement of neighbouring joints whilst the other in recommending mobilisation treatment insists that movements should be active in character and painless. A patient with a fracture cannot very well be induced to move his limb enough to cause actual disturbance of the relation of the bone fragments to each other, for this provokes great pain and by reflex muscle spasm limits the causative effort.

In spite of careful treatment surgeons do meet with cases of non-union, and Prof. GROVES's classification into two types is of great practical importance. In the form in which cell activity fails, measures which further local nutrition should be instituted, a fact which suggests that such non-union may depend upon injury to the nutrient vessels occurring as part of the original accident. The slow repair after plating operations can certainly be attributed to extensive stripping of the periosteum which sometimes is unavoidable. When firm fibrous union with eburnated bone-ends occurs, an operation which removes the sclerosed tissues and opens up new paths for the osteoclasts becomes necessary. This points to some barrier to the growth of osteoblasts across the interval between the fragments being present from the first, since bone formation in the actual bone-ends is stimulated. The obstruction can conceivably be intucked periosteum, which as MACEWEN showed opposes great resistance to the through passage of bone-cells and possesses, in fact, bone-absorptive, as well as bone-forming properties. Nothing but an open operation will remove such an obstruction and allow the normal healing process to proceed. In the treatment of fractures both fixation and movement have their place. To apportion the right relative value to them, perhaps, would be to say that fixation of the bone-ends is an essential, whilst movement of the surrounding soft parts is desirable.

THE MELANOMATA.

THE suggestive fact emerges again and again that the advances of morbid anatomy are often incompatible with the most sacred dogmata of orthodox biology. Thus, the "law" of the "specificity of the germinal layers" decrees that, once these layers are formed in the embryo, they proceed in their differentiation in certain directions only and give rise only to certain kinds of tissue for which they are "predestined" by this law. When, for instance, the formation of mesenchyme by budding from the primary germinal layers, the cells of which are of an epithelial habit, ceases, it ceases for ever. From now onward the cells of the ecto- meso-, and endo-derm remain epithelial. We may well ask: Why should a process that takes place upon an extensive scale during the early stages of development necessarily terminate at the precise moment at which it ceases to be observed by embryologists? May it not be that the capacity is now merely latent normally but subject to revival by the action of a pathological change? It might be well for biologists, before they tell pathologists that their education has been neglected when they describe phenomena that are contrary to "biological laws," to ask themselves if these "laws" do not, perchance, require revision in the light of pathological knowledge. There have been heterodox biologists—to mention only MAURER, SCHUBERG, and more especially RETTERER, who claim that mesenchyme formation continues throughout life. It is to be feared that their writings are not much read. RETTERER insists that practically the whole of the cutis is derived from the epidermis by post-embryonic budding of its cells.

Pathologists can, of course, form no authoritative opinion of the merits or demerits of writings which are concerned with the phenomena of normal growth, but there are many instances of abnormal growth of an analogous nature which are within the province of pathology. The whole of the October issue of the *Edinburgh Medical Journal* is given up to a monograph [1] by Dr. J. W. DAWSON upon the melanomata, which is heretical and open to the severest disapprobation of orthodox biologists since he is unafraid to tell

[1] The Melanomata; their Morphology and Histogenesis. By James W. Dawson, M.D., D.Sc., F.R.C.P.E., Histologist, Royal College of Physicians' Laboratory, Edinburgh.

us what he has learned from the study of his material. He has approached his subject with an unbiased mind and, after careful consideration of the contending views, has been driven to the conclusion that the melanomata are epithelial tumours, the result of post-embryonic, pathological attempts at the conversion of epithelium into mesenchyme, attempts that are often crowned with success. The idea is not new. It was propounded nearly 40 years ago by KROMAYER, UNNA, and others, and has since then gained an ever-increasing number of adherents. Dr. DAWSON'S material is rich and well digested. His illustrations are admirable, and unlike so many morbid anatomists he realises that they form the surest proof of his arguments. His conclusions fall into two groups. He shows that the pigment melanin is produced solely by the epithelial cells of the ectoderm—i.e., the epidermis and its appendages and the central nervous system. True "melanoblasts" are epithelial cells which may, however, enter the deep tissues. They are distinct from the mesenchymal "chromatophores" which ingest the pigment by phagocytic action but do not produce it. He traces the formation of the "nævus" cells from the epithelium in cutaneous moles and the melanotic tumours which arise in them. With the help of beautiful drawings he shows the extreme polymorphism that the cells of these tumours assume and that the melano-carcinomata, -sarcomata, -fibro-sarcomata, &c., are but different forms of the same tumour. He concludes that even the most "sarcomatous" melanomata are epithelial tumours and extends this conclusion to the ocular melanomata. It is to be regretted, for the sake of completeness, that he does not deal more fully with the rare recorded instances of melanomata of other parts of the body. Dr. DAWSON does not go so far as KROMAYER and admit a complete "desmoplasia" (or assumption of all the characters of connective tissue) of epithelial cells. He is perhaps wise not to do so. His paper is a valuable contribution to the question of the specificity of the germinal layers, which will have to be considered not only by pathologists but by general biologists.

A CONQUEROR OF INSECT PESTS.

Prof. MAXWELL LEFROY, whose obituary notice appears on another page, was perhaps the foremost economic entomologist in the British Empire. In the course of his career he had three really spectacular successes. The first was when he went to the West Indies. The sugar-cane, on which the prosperity of the islands depended, was being destroyed by a beetle which bored into the stems. LEFROY discovered that the eggs of this insect were laid on the backs of the leaves; he described the appearance of the egg-clusters, and small native boys were employed to scrape them off the leaves and the sugar-cane crop was saved. When he arrived in India the corn crops in certain districts were being devastated by a plague of locusts. The seriousness of the situation may be judged from the fact that the crop reaped was only 25 per cent. of the normal yield, and in India, where the peasant proprietors live close to the margin of subsistence, there was imminent danger of famine. LEFROY discovered that the locusts kept flying about the same locality until the rains came and softened the ground; they then descended to the ground and laid their eggs in holes bored in the earth. Once the period of oviposition was determined, it was easy to calculate when the wingless young (*nymphs*) would hatch out, and LEFROY constructed what may be termed shrimping-nets out of light bamboo and sent the native boys with them through the growing corn, with the result that the young locusts were captured by the sackful and the next year's crop was normal. Lastly, when he was sent to Australia in the latter part of the war he had also a very serious situation to deal with. The Imperial Government had purchased large amounts of Australian wheat which was stored in Australia where it was being rapidly destroyed by weevils. LEFROY discovered that the wheat was contained in sacks which were piled on the ground covered with insufficient roofing and inadequately protected against rain and damp. The lowest bags burst and the grain exuded and thus easy access was afforded to the weevils. LEFROY found that the grain weevil was an insect which had lost the use of its wings and that it always began its attacks by entering grain lying on the ground, so he directed that the grain should be housed in sheds provided with an adequate flooring raised two or three feet above the ground and that the soil beneath them should be treated with disinfectants such as naphthalene. These measures were entirely successful in stemming the weevil plague. LEFROY always insisted on the importance of studying insects in the open under natural conditions. Quite early in his career he laid down the thesis that to attack an insect pest successfully its whole life-history must be studied; then the weak links in its chain of developmental stages would be discovered where the attack could be successfully pressed home. Whilst he recognised the importance of a knowledge of their structure, which is as indispensable a pre-requisite as the study of grammar in learning a language, he maintained that all further knowledge should be gathered in the field. "One must live with insects," he said, "in order to know them."

VACCINIA AND VARIOLA VIRUSES.

THE ultramicroscopic viruses are notoriously difficult to study, for obstacles, in some cases seemingly insurmountable, are encountered by whatever avenue the territory of these smallest of living creatures is approached. Too small to be directly visible with the microscope, difficult to cultivate, and, even if cultivable, without distinctive reactions, we have been left only with the crude test of demonstrating their presence by inoculation of a bacteria-free filtrate into living animals. Filtration and inoculation experiments, depending as they do on such variable factors as the construction of the filter and susceptibility of the animal, have not hitherto encouraged accurate quantitative work. Perhaps some entirely new method of approach must be discovered before these ultramicroscopic viruses can be scientifically classified. In this connexion it is instructive to notice that Dr. Mervyn Gordon, in his studies on the viruses of vaccinia and variola (summarised in our last issue), has departed from the conventional technique of bacteriological examination, for we read practically nothing in his report of attempts to see these viruses with the microscope, or to stain them, or even to cultivate them in the customary fashion. He has relied entirely on experimental work on animals and is to be congratulated on having succeeded in introducing more accurate quantitative methods of analysis. He found the shaved skin of the rabbit a delicate indicator for vaccinia virus and devised methods for measuring the minimal vaccinial dose, and has made a careful study of the properties of antivaccinial serum by quantitative

means. The most sensitive test for the presence of vaccinia virus is undoubtedly the cutaneous test of virulence, but the complement-fixation and agglutination tests, though their range is shorter, are not lacking in specificity, and, since they provide an independent measure, they form a welcome addition to our armamentarium. The special feature of Dr. Gordon's work is the successful employment of serological methods, which has been made possible by employing homologous (rabbit) pulp as a virus, and the proof that complement fixation and agglutination occur with vaccinia virus in much the same way as with pathogenic bacteria brings vaccinia into line with the latter group. The experiment in which an immunised serum produced a definite immunity are also of interest.

Some of the experiments which Dr. Gordon reports in the permeability of various surfaces of the rabbit to the virus of vaccinia raise the question whether the main natural method of spread of this bovine disease may not be in part by the respiratory tract rather than by fortuitous cutaneous inoculation as hitherto supposed. He found the most certain way of introducing the vaccinial virus to be by scarification of the skin, but in the absence of mechanical injury the most susceptible and permeable of the surfaces of the rabbit seems to be the nasal mucous membrane. When vaccinia virus gains access to the nasal mucosa, after an incubation period of six to eight days, a condition of acute nasal catarrh develops, accompanied by a muco-purulent nasal discharge which at the onset contains the virus of vaccinia in abundance. Animals thus infected became immune to vaccinia. Confirmatory evidence of the capacity of the nasal mucosa to absorb antigen was furnished by control observations in which the application of killed *B. coli* to the mucous membrane of the nose was followed by the appearance of specific antibodies to that micro-organism in the blood. He observes that the limits of this physiological property of the nasal mucosa and the degree to which it can be exploited for prophylactic purposes have still to be determined. The acute attack of nasal catarrh which follows after an incubation period when the vaccinial virus has gained access to the nasal mucous membrane links up the disease which we call vaccinia to the group of influenza and the common cold. It is important that we should obtain further information on the natural distribution and mode of spread of vaccinia virus in the animal kingdom. Thanks to the accurate analysis which Dr. Gordon has made we now possess a triple index—namely, the cutaneous virulence test, the agglutination, and complement-fixation tests, wherewith to identify the presence of vaccinia virus and to estimate its abundance.

A point of great practical importance demands a word of emphasis. Dr. Gordon found when studying seven different kinds of calf lymph in use in this country for purposes of vaccination that these varied very greatly in their potency. Some were active at a dilution of 1 in 100,000 and others only at a dilution of 1 in 100 or even 1 in 10. Since calf lymph is known to deteriorate on keeping it would have been interesting to know something more of the history, particularly the age, of the samples examined. No information on this point is given in the report, but as the facts are presented they seem to suggest that a very significant and inexcusable variation exists in commercial samples of calf lymph. Obviously this is a question which requires official attention. A further feature of Dr. Gordon's work which has practical implications is his research on the comparative value against vaccinia of disinfectants. The striking powers of potassium permanganate which he reveals should encourage its use in small-pox, which has hitherto been largely empirical.

Annotations.

"Ne quid nimis."

THE CATARRHAL CHILD.

THE importance of catarrhal conditions in childhood in laying the foundations of future disease has received a greatly increased measure of recognition during the present year. This recognition is evidenced by the appearance of several contributions to medical literature which show not only that pædiatrists of high standing in medical practice and in the public services have given their serious attention to the subject, but that their observations have led them to differ in important respects from many of the earlier accounts of catarrhal states. A notable instance of this difference is to be found in the age which is regarded as typical for the onset of catarrh. The "catarrhal child," as hitherto depicted, is usually in the second year of life, or older, and presents features which are either typical or suggestive of rickets; by many writers the catarrhal symptoms have been regarded as essential manifestations of rickets, the causative factors being, at any rate, nutritional and environmental. The article by Dr. R. C. Clarke, which appears in our present issue, introduces some striking modifications of this conception of the ætiology and incidence of catarrh. According to his account, respiratory catarrh is extremely common in the first few weeks of life, being present in as many as 50 per cent. of the infants which he examined. He has frequently noted the presence of Harrison's sulcus in young infants, and regards it as evidence, not of rickets, but of nasal obstruction consequent upon catarrh; he bases the diagnosis of respiratory catarrh on this sign in conjunction with snuffles and bronchial râles. In early infancy nasal catarrh is almost always accompanied by bronchial catarrh, whereas in late infancy the majority escape this complication, hence the prime importance of protecting the infant from infection during the first three or four months. Dr. H. K. Waller, in a memorandum on the catarrhal child, which appeared in the recent report of Sir George Newman to the Minister of Health, gives a description of this type of case, which is in many respects in close agreement with the views expressed by Dr. Clarke. The prevalence of catarrh in the first weeks of life is emphasised, as are also the interference with efficient sucking, and hence with nutrition, the development of "tonsils and adenoids," and the increased susceptibility to febrile attacks and to infection with pyogenic organisms. Both Dr. Clarke and Dr. Waller lay stress on the necessity of protecting the infant from catarrhal organisms, and recommend as the most useful measure for this purpose the use of a mask or folded handkerchief by the mother or nurse who is attending to the child. On the more speculative problem of ætiology the agreement between the two articles is less complete. The traditional association between rickets and catarrh must necessarily be called in question by those who regard the latter as an ailment of early infancy. Dr. Clarke does not discuss this point; Dr. Waller meets it with a suggestion which inverts the hitherto established view of the causal sequence. "The rachitic child's tendency to febrile reactions has been frequently described. It is possible that the catarrhal diathesis has been overlooked as a predisposing factor in producing rickets." A further question inevitably arises if the typical age-incidence of a morbid state is found in the first weeks of life: Does heredity play a part in the ætiology: Dr. Clarke answers this decidedly in the negative: Dr. Waller gives cautious expression to the idea that a hereditary element is likely. Should both Dr. Waller's suggestions receive further elaboration, he may provide one more complication to the vexed problem of the ætiology of rickets.

THE CARE OF THE CONVALESCENT.

WHEN a patient has "turned the corner" of a grave illness and it is safe to relax the vigilant care he has hitherto demanded, the doctor is liable to lose interest to some extent in the further progress of the case. It is a very natural reaction from the strain of his heavy responsibilities; when recovery is practically assured he can minimise the output of his mental energy and with a cheery "How are we to-day?" can chat of irrelevant matters with a vague idea of "cheering the patient up." Yet to the patient himself the period of convalescence is, perhaps, the most trying part of the illness. In the acute stage he lies passive, concentrated on the one supreme effort of battling for life, and released from all other responsibilities by the assiduous care of doctor, nurse, and friends. As life comes back gradually from this relatively simple form to the highly complex thing that modern civilisation has made it, his enfeebled powers are apt to groan under the burden they have once more to pick up and carry. The "fractiousness of convalescence" is so unimportant compared to the life-and-death issues we have to control as best we can that doctors and nurses are too prone to dismiss it with a patronising smile and forget that the patient is not fractious from love of evil or original sin, any more, indeed, than is the child; both are struggling with an adjustment to life that is slightly overtaxing their powers of adaptation. The convalescent period is well worth the thoughtful attention of the practitioner. The Public Health Committee of the New York Academy of Medicine recently appointed a subcommittee to consider the problem of convalescent care. In presenting their report[1] the Committee say that "it is remarkable that more has not been accomplished in the way of making provision for the care of convalescent patients. Homes have been established on no coördinated plan . . . . without much realisation of the various types of convalescence, and the needs of adult convalescents have received scant attention. No doubt one of the main reasons is that hitherto not enough study has been made of the subject." They begin by drawing a clear line of distinction between patients progressing towards recovery from some acute illness and those with persistent symptoms of functional disturbance but with slight or no evidence of organic disease. The first group they classify, according to the type of disease, as cardiovascular, dietetic, respiratory, and miscellaneous, and for each a different régime of convalescence should be provided. Those for whom special dietetic supervision will be required must further be subdivided according to whether they are diabetic, nephritic, or alimentary. But the medical classification, although it may be adequate enough for acute stages of illness, is only a small part of the total to be considered in catering for the convalescent. Age, sex, social status, religion, financial resources must all be allowed for, as well as that ever-present problem of the slum-worker: the convalescent mother with a toddling family that cannot be left at home alone. Last, but by no means least, is the individual temperament. One case will fret himself ill with boredom if sent to a country house five miles from the station; another will lose half the benefit of his convalescence if it is spent hectically at a popular seaside resort.

The American report deals chiefly with the convalescent home, and is of the opinion that the ideal home is a system of cottage units, arranged in single rooms, and three- or four-bed wards situated a little distance outside the urban area it serves. The patients should be selected according to the classification suggested, and should be subjected to a daily schedule of living, prescribing their hours of rising, rest, and retiring, physical exercise, recreation, social diversions, and diet. The cardiac group must have a home of two floors only in a low-lying district, while the respiratory group need more than their share of fresh air. The aim of the home should be educational as well as restorative, so that the patients learn habits of hygiene which they can carry back to their own homes. The Committee recommend the appointment of a resident medical officer to every convalescent home—a far-reaching reform if a possible one. While the ideal—if somewhat bureaucratic—conditions laid down by the Committee are not likely to be attained in this haphazard world, they will have done a real service to the profession and the community if they stimulate the average practitioner to giving more real thought and care to the planning of his wealthier patient's convalescence or the choice of home for the poorer.

[1] Hospital Social Service, 1925, xii., 26.

CANCER-LIKE CHANGES IN TISSUE CULTURES.

IN a recent paper[1] Dr. R. J. Ludford described nuclear changes occurring in the fibroblasts from the kidney of rats cultured in vitro. Fixed preparations show a partial extrusion of nucleolar matter into the cytoplasm where it is surrounded by a vacuole, and eventually disintegrates. This process is accompanied occasionally by a similar passage of a portion of the nuclear contents into the cytoplasm by a process of budding off. The extruded nuclear contents may persist for a time as a secondary nucleus and then break down. In fresh unstained cells kept in a warm chamber amœboid movements of the nucleolus could be observed, and also a movement of the nucleolus towards and away from the nuclear membrane with occasional indications of a discharge of nucleolar material into the cytoplasm. Prolonged observations in fresh cells were rendered difficult by the fact that at body temperature the nucleolus and nuclear membrane are more difficult to distinguish than when the preparation is allowed to cool to room temperature. Such nuclear extrusions occur also in normal cells in the living animal, though infrequently, but they are of common occurrence in cancer cells, where in the past they have been mistaken for cancer parasites. Dr. Ludford does not attempt to interpret these changes except as giving evidence of an interaction of nucleus and cytoplasm. But it seems reasonable to suggest that their frequent occurrence in cancer and in normal cells cultured in vitro may be associated with abnormal conditions of growth and nutrition.

Writing on the same subject,[2] Prof. A. Maximow records and figures even more pronounced changes occurring in the mammary gland cells of the rabbit cultured in vitro under special conditions. The special conditions are the addition of bone-marrow extract, instead of embryo extract. The addition of bone-marrow extract elicits not only a rapid growth especially of the cells lining the ducts, but also hypertrophy of the cells, changes in their form, formation of cell nests, and even an infiltration of the connective tissue. It is noteworthy that these changes are exhibited almost entirely by cells derived from the epithelium lining the ducts. As a result, many of these cultures present appearances which are morphologically indistinguishable from those of a carcinoma. Indeed, Maximow speaks of these appearances as "carcinomatous changes." He realises that definite proof of such a change having actually occurred in these cells can only be brought by reimplanting these cultured cells into a living animal. If these cells have really undergone a carcinomatous change they should, on reimplantation, continue to grow in vivo. But while a positive result would prove his contention, a negative would, according to Maximow, not necessarily disprove it, because even spontaneous carcinomata do not always give positive results on transplantation.

The resemblance of Prof. Maximow's tissue cultures to carcinoma is so suggestive that his contention deserves to be submitted to exhaustive experimental tests. At the same time it is well to bear in mind that this resemblance is merely morphological and

[1] Proc. Roy. Soc., B, 1925, xcviii., 457.

[2] Cancer-like Changes of the Mammary Gland in Tissue Cultures, Virchow's Archiv f. Path. Anatomie, 1925, cclvi., 813.

may be no more than the manifestation of growth under abnormal conditions. It may, in fact, bear the same relation to cancer as the noise and clatter of a passing train has to the electricity that moves it.

VITAL STATISTICS OF SCOTLAND IN 1924.

THE seventieth annual report of the Registrar-General for Scotland contains many tables of interest to the student of vital movements. But he can hardly fail to regret that this report, like other Scottish statistical reports, is not tabulated and classified on identical lines with the corresponding English reports, and that no comparative figures for the two countries and some other countries are given. The value of both the English and the Scottish reports is materially lessened thereby. The course of the Scottish birth-rate is downward, like that for other countries, but its cause has differed in detail from that of England. Until 1894 it was always over 30 per 1000, but is now only 21·9. As is well-known, the illegitimate birth-rate is high in Scotland. In 1924 it varied from 9·3 in the larger burghs per 1000 unmarried women of child-bearing ages to 13·3 in the country districts. It was as high as 24·8 in Moray, and as low as 4·7 in Shetland. This high rate is not a correct index of sexual morality, and must be corrected inter alia by reference to the marriage laws of Scotland. The average age at marriage is of interest in this connexion, having been 29·35 years for all bachelors and 26·56 for all brides. This shows a gradually increasing postponement of marriage.

From the public health point of view, the review of the Scottish vital statistics presents features of much interest. The rate of infant mortality was 97·7 per 1000 births, a low rate compared with past experience, but high, relatively, to that of England. It varied in the larger burghs from 132·9 in Paisley and 118·5 in Glasgow to 90·7 in Edinburgh and 90·6 in Perth. There is no full index to the report, but no attempt appears to be made to analyse for the whole of Scotland or for its chief towns the distribution of infant mortality in the months of the first year of life, information which is an indispensable preliminary to any attempt to ascertain at what ages infant mortality is most excessive, at what ages it is higher in some burghs than in others, and to what causes these local excesses are due. Such information as is here indicated, but expanded, is an urgent necessity for public health purposes. It is necessary that it should be done comparatively for different areas in Scotland; and the rates thus published would be invaluable as guides to medical officers of health in pressing forward accurately-directed public health work. It is satisfactory to note that for the first time in its statistical history no deaths occurred last year from typhus fever. The tuberculosis death-rate was 116 per 100,000 of population, a lower rate than in any preceding year. This is higher than that of England, and the variations in different parts of Scotland are so remarkably great as to bespeak the need for special public health investigation. Thus, in Shetland the tuberculosis death-rate was 247 (per 100,000). The population being small, this means 59 deaths; but evidently this is a case in which intensive effort at public health administration with better housing might be expected to effect rapid improvement. The next highest tuberculosis death-rates were 158 in Sutherland, 156 in Ross and Cromarty, the counties with a large population having the lowest rate being Fife (87 per 100,000) and Ayr (84 per 100,000). In Lanarkshire, which comprises nearly one-third of the population of Scotland, the rate was 132. Only a short paragraph is devoted to the important public health problem of puerperal mortality. For the whole of Scotland this reached the high figure of 5·8 per 1000 births, varying in the larger burghs from 12·2 in Coatbridge and 11·7 in Perth to 5·8 in Glasgow, 4·7 in Aberdeen, and 3·9 in Dundee.

Further tables bearing on the main problems of public health, including those indicated in the preceding paragraphs, would add greatly to the value of the Scottish statistical report, and it may not improperly be suggested that a chief value of the tabulation of registered deaths according to age and cause of death lies in the extent to which they make manifest areas of excessive mortality in one or other respect, and enable medical officers of health and sanitary authorities to direct their efforts to improve the national health where they are most needed and where their effect will be greatest.

RADIOTHERAPY AT LEEDS.

THE General Infirmary at Leeds is to be congratulated on the recent addition of a new radiotherapeutic department, the creation of which has been made possible by the generosity of two donors, Mr. J. B. Sykes, of Horbury, who has presented the building, and Miss Walker, of Chapeltown, Leeds, who has met the cost of the artificial sunlight apparatus. Through this gift Leeds now possesses one of the largest and best departments of its kind in Britain. The new building measures over 100 ft. by 45 ft., and contains 11 treatment rooms as well as instrument rooms, waiting rooms, staff rooms, dressing rooms, and workshop. The building is very airy and well lighted, and a broad corridor down the centre provides access to the various rooms. Five of the treatment rooms are devoted to deep X ray therapy, and each cubicle is equipped with apparatus capable of generating 200,000 volts and upwards. Provision is made for the housing of the apparatus in a large instrument room at the back of the cubicles. Special care has been taken to provide for the adequate protection of the staff by heavy lead linings in all the cubicles, and the controls are placed in a special room outside within easy reach of the operator. The cubicles are lofty and are lighted from above, while central heating has been adopted throughout the building. The "artificial sunlight" department consists of six treatment rooms; the two largest, measuring 20 ft. square, are for men and women respectively. Dressing rooms are attached to each, and an observation room is provided so as to control both treatment rooms. Each room is equipped with two "Mountain Sun" mercury-vapour lamps, and two arc lamps together with special radiant heat lamps. A separate room for the treatment of cases unable to sit or stand is equipped with lamps which can be used while the patient reclines on a couch. Another room is reserved for children, and similar equipment of arc and mercury-vapour lamps has been provided here. A special room for treatment by the Kromayer lamps is placed at the end of the long corridor, and one of the largest rooms has been set apart for Finsen light treatment of lupus and similar diseases. At present upwards of 100 cases a day have been receiving "artificial sunlight" treatment, but the new department will extend the scope of daily treatment to over three times that number. With this equipment we may confidently expect that Leeds will achieve results not only of immediate benefit to local patients, but of value to the progress of this branch of medical science.

PIONEERS IN TROPICAL MEDICINE.

WE are apt to regard tropical medicine as a child of recent infancy, but several years before the battle of Waterloo it was a well-grown stripling, although it did not come into its full inheritance until the present century. Pioneers in Tropical Medicine was the subject of Dr. Andrew Balfour's presidential address to the Royal Society of Tropical Medicine and Hygiene held at 11, Chandos-street, London, on Oct. 15th, when, with the aid of beautifully prepared portraits on the epidiascope, he gave cameo biographies of the men who throughout the nineteenth century—and before—had toiled to raise the symbol

of Æsculapius along with the British flag in all corners of the world. The list of British pioneers, and in this field Scotsmen are well to the fore, is a long one; in the course of an interesting hour Dr. Balfour could do no more than briefly touch on the more outstanding figures of that company. The stimulus to the study of tropical diseases was first felt in the fighting services in their campaigns overseas in the warring years of the late eighteenth century, and it was Sir John Pringle (1707–83), "a pursy and peppery gentleman," who founded military hygiene, groping his way in the dark without the aid of such useful things as statistics or precedents. He published a book in 1775 on Observations on Diseases in the Army, and was subsequently elected President of the Royal Society. From his works we know how common in those days was helminthiasis, and he specifically recommends bleeding in the crises of malaria, "which," Dr. Balfour said, "was not at all a bad idea"; but he is best remembered as a hygienist who made a careful study of the rationing and the diet of the soldiers. His parallel in the senior Service was James Lind (1767–94), perhaps a greater man even than Pringle. He served in the tropics and there gained a first-hand knowledge of local diseases. He was a man singularly modern in his ideas, an earnest worker, and a clear thinker. With him two other names are associated, Sir Gilbert Blane, who introduced lemon juice into the Navy as an antiscorbutic, and Surgeon (Thomas) Trotter. They were a wonderful trio, thrown together in the wars against France. Pringle was followed by Donald Monro (1729–1802), who wrote an amazingly modern essay on the preservation of the soldier's health in camps. Among many names worthy of record are those of Benjamin Rush, who first described dengue, and by his energetic efforts did much to quell the outbreak of yellow fever in Philadelphia in 1793, and Annesley, of Dublin, who recorded the experience of 30 years' service in the tropics. In the middle of the nineteenth century George Biddy showed that the spread of cholera was due to human intercourse; Edmund Parkes (1819–76) suggested the possibility of healthy carriers, and John Snow went a step further and reasoned out that the poison of cholera was contained in human excrement. Biddy also introduced humane treatment of the insane in India, and in 1886 he instigated the systematic inspection of Indian school-children. Among the Americans after Rush who have done pioneer work in tropical medicine comes Josiah Clark Nott, while Walter Reed and Surgeon-General Sir William Crawford Gorgas are familiar names. Women, too, have played their part in this great work, although not perhaps in a strictly medical or scientific field, and Dr. Balfour gave a brief history of the lives of Florence Nightingale, Mary Kingsley, of West Africa, and Mary Slessor, of Calabar. The spirit and achievements of Dr. David Livingstone was the vanguard of medical advance in the dark continent. Dr. Balfour drew shrewd conclusions from the portraits he showed on the screen as to the characters of the subjects, which made his lecture one of living and personal interest.

PEPYS AND SCIENCE.

THE Master of Christ's College, Cambridge, himself a writer of picturesque accuracy, is the very man to write with understanding and sympathy about that delightful seventeenth century Horace Walpole whom we know as Samuel Pepys, secretary to the Admiralty. In the current *Quarterly Review* Sir Arthur Shipley points out how science in Pepys's time was the "object of an insatiable curiosity, perhaps in a way childish," and how Pepys himself was insatiably curious. Nothing was too odd or too trivial for his notice and record. On March 14th, 1662, he met a German, Dr. Kuffler, who came "to discourse with us about his engine to blow up ships," a subject naturally interesting to a high official of the Admiralty. Although he only began to learn the first four rules of arithmetic in his thirtieth year, he was yet a great friend of Edward Cocker, who engraved a slide rule for him. On account of his defective vision he took much interest in optics and records how in company with Mr. Spong and "my twelve foot glass"—i.e., one with a focal length of 12 feet—"we did see Jupiter" and had "several fine discourses upon the globes this afternoon, particularly why the fixed stars do not rise and set at the same hour all the year long, which he could not demonstrate, nor I either." Let us hope that comprehension is wider nowadays. Pepys was elected to the Royal Society in 1665 and in 1684 became its President. It was during his term of office that Newton's immortal work, the "Principia," was accepted and published by the Society under Pepys's imprimatur. Many passages in the diary are quoted by Sir Arthur Shipley, which show how constantly Pepys attended meetings and demonstrations, several of which dealt with transfusion of blood. He also at "my Lord Crewe's" and other places met various learned persons who told him extraordinary stories about swallows hibernating, a belief which even Gilbert White held, and one of these, Mr. Templer —"an ingenious man and a person of honour he seems to be," says Pepys with unwonted caution—told a story of how serpents in Lancashire catch larks by crawling under a soaring lark and with wide open mouth eject their poison, whereupon the lark falls down into their jaws. Many similar startling episodes in natural history will be found in the pages of the Revd. Edward Topsell, who wrote a "History of Beasts and Serpents," to which Dr. Muffett contributed a section upon insects. Pepys relates a story from Muffett about Dr. Caius, and it is not unreasonable to suppose that he was acquainted with Topsell's book, the matter of which would certainly have interested him. So many facets did Pepys present to the world that, as Sir Arthur Shipley puts it, "he appears to have been almost globular."

RADIOGRAPHIC DIAGNOSIS OF SPINAL DISEASE.

IT seems that French radiologists of eminence have found difficulty in distinguishing between a malignant metastasis and a tuberculous condition such as Pott's disease. French descriptions of the differential diagnosis are brief and inadequate, one recent publication dismissing the matter with the statement: "The invaded bodies show abnormal transparency. The spongy tissue progressively disappears; the vertebral body crumbles; as a result there are deformities analogous to those of Pott's disease." A well-illustrated monograph [1] by Prof. J. A. Sicard and MM. J. Belot, Coste, and Gastaud makes good this defect. These investigators divide metastatic cancer into three main types—osteoporotic, osteoplastic, and para-cancerous changes. Under the first heading they discuss the differential diagnosis of Pott's disease and neoplastic metastases, pointing out that the latter are primarily and always osseous, and never cause any alteration in the intervertebral discs, even in an advanced stage. Generally the destruction results in a thinning of the vertebra until it becomes less than a fifth of its normal height. The disintegration of the vertebra is always more visible on the side than on the front, and is often the only radiological evidence. The compression of the body seems to compensate, from the point of view of transparence, for the structural alteration. Screening the spine may be the only means of diagnosing new growth of the prostate, so often symptomless at the primary focus. It is characterised particularly by an osteoplastic metatasis first described by Recklinghausen in 1891. At post mortem a great many of the bones are found thickened, eburnated, and abnormally hard. The remarkable diffuseness of the lesions is the most striking feature; starting from the primary focus in the prostate the process attacks first and most

[1] Aspects Radiographiques du Cancer Vertébral, Jour. de Radiol. et d'Electrol., August, 1925.

extensively the lumbar region and pelvis, but extends even up to the ribs and humeral heads. Naturally, the resulting anæmia is marked, and Assman diagnosed a prostatic growth on this anæmia combined with bilateral sciatica alone. A less exuberant osteoplastic form of metastasis is met with in mammary and pyloric cancers. The thyroid metastases, on the other hand, are exclusively of the decalcifying, destructive, "osteoclastic" type. The osteoplastic reaction may also take the form of "opaque vertebra," a condition reported by MM. Souques, Lafourcade, and Terris from a case of mammary scirrhus at the Salpêtrière. These opaque vertebræ are seen in cases where syphilis is present and may be the cause, but the authors prove conclusively from post-mortem cases that cancerous "opaque vertebræ" exist. Under the heading of "paracancerous lesions," the authors discuss whether a cancer can destroy bone from a distance without the actual presence of its cells, thus preparing the way for a metastasis. At present they do not feel justified in postulating more than paracancerous bony dystrophy. In a case of prostato-pelvic cancer under their care a radiological examination revealed a medullary-osseous fibrosis with hypercalcification throughout the whole skeleton, exactly similar to that associated with epitheliomatous infiltration in the lumbar region. H. Roger [2] has recorded a case of cancer of the breast showing a similar change in parts remote from any direct infiltration or metastasis. Primary tumours of the vertebral column are not common. Sarcoma tends to start on the outside and grow into a large tumour of the back without compression of the cord. Secondary neoplasms, according to Fraenkel, never give this large enveloping shadow, but the distinction is not quite so absolute as he implied. The radiological diagnosis of vertebral rheumatism, infectious arthritis, osteomalacia, traumata, and malformations are also discussed.

GERMAN MEDICAL CONGRESS.

THE Deutscher Aerzte-Vereinsbund held its annual meeting this year in Leipzig in association with the Leipziger Verband, the great medical union which is now called Hartmann-Bund in honour of its late founder; 267 delegates were present, representing medical societies and local branches with a total membership of 33,581. After the usual addresses of welcome the meeting discussed the suggested codification of medical etiquette. The proposal contained rules on professional secrecy, on advertising, and on the question of the qualification of specialists. The sale and the purchase of a medical practice is held to be unprofessional except in cases where the widow or the children of a deceased medical man offer his practice for sale. It is further unprofessional to criticise other medical men, to give medical advice, or to practise during a holiday stay in a health resort where other medical men are settled, and to give testimonials for "secret" medicines. The establishment of a joint practice is allowed only between specialists of the same branch or between general practitioners, but not between a specialist and a general practitioner. Canvassing is strictly forbidden and contracts allowed only under the rules of the Hartmann-Bund. Owing to the difficulties of the matter the codification was entrusted to a special committee for consideration. Another subject of discussion was the rôle of medical men with regard to the extensive physical culture activities which are now very popular among the younger generation of the German people. Special courses of instruction in the examination of amateur athletes have been instituted in several cities and universities. It was resolved that the medical advisers of sports societies must examine the members only as to their ability for the particular sport practised, but must strictly refrain from attending members in a general way. The forthcoming reform of the German criminal code, although it has not yet been brought before Parliament, was then discussed from a medical point of view. The principal items of medical interest are that a criminal shall be held responsible for his actions even when in a state of diminished consciousness caused by drunkenness, drunkenness being no longer regarded as an extenuating circumstance. Drunkards shall be subjected to special measures, such as compulsory detention in an asylum, prohibition to obtain intoxicating liquor, loss of civil and voting rights. Other items of interest deal with homosexuality which shall continue to be a criminal offence for men but not for women. Professional secrecy shall not be binding when it conflicts with the public interest as, for instance, in the case of infectious and venereal diseases. On the question of criminal abortion, which had already been discussed in the Bavarian branch of the Association (see THE LANCET, Sept. 19th, p. 620), this meeting came to the same conclusion as that branch. A communist delegate pleaded for absolute liberty in the matter of abortion as existed in Russia, because, he said, abortion should be regarded not from an ethical but from an economic standpoint. Finally the Congress discussed the question of quackery and unqualified practice and voted for its absolute suppression and for an alteration of the law to that end. Jointly with the Aerzte-Vereinsbund, the Hartmann-Bund discussed questions connected with club practice, the extension of the club system to the middle classes, and the systematic distribution of medical men throughout the country.

[2] Marseille Médical, Feb. 15th, 1925.

ATHLETICS AND ECONOMY.

THE review which we publish of Mr. Gilbert Bourne's book on oarsmanship recalls to mind part of Prof. A. V. Hill's address to the British Association on the Physiological Basis of Athletic Records.[1] Wasteful effort in muscular movements may be usefully demonstrated by the slow-motion cinematograph, and the economical use of energy is of no less interest when studied physiologically. According to the observations of A. V. Hill and H. Lupton the maximum efficiency of human muscular movement is obtained at speeds of about one maximal movement per second. In rowing, experience agrees that such a speed is about the optimum; in an eight-oar boat the recovery takes almost as long as the stroke, and 32 strokes per minute is generally regarded as the most efficient rate. By a muscular mechanism depending on the formation of lactic acid the body can get into debt for oxygen, and the amount to which this is possible varies with the individual; but when the account has been overdrawn to the extent of more than about 15 litres of oxygen (1 litre of oxygen consumed liberates enough energy to raise one ton about seven feet), the average athletic man becomes incapable of further effort. Thus, although it is permissible in a very short rowing race to work less efficiently by adopting a faster stroke, the work done will not be proportionately greater, and exhaustion will soon set in. When the body is working against an external resistance as in rowing there is an optimum speed, and if the effort is to be long continued it must be made at a speed not far from this optimum. In running, however, the work is absorbed by the viscous-elastic properties of the muscles or internal friction, and there is no optimum speed; the expense of the movement increases continually as the speed goes up. According to Prof. Hill a speed of 280 steps per minute requires 24 litres of oxygen per minute, whilst a speed of 240 steps per minute requires only 8 litres. Great effort is obviously not economical. It is said that to run a railway train at 50 miles an hour needs twice as much coal as to run it at 40, and accordingly the railway companies are prejudiced in favour of the latter speed. In the same way the average citizen in sedentary employment rightly refuses to develop his muscles and his powers to the pitch advocated and demonstrated by the late Mr. Eugen Sandow. Training may increase the ability to get into debt for oxygen and it certainly

[1] The Advancement of Science. 1925. Published by the British Association for the Advancement of Science, Burlington House, London, W. 6s.

makes for accurate muscular movement, but whilst none can deny the value of exercise it is unnecessary to develop great athletic power in those whose station in life does not give a high value to strength or rapid movement. "The little more, and how much it is" is of great value in creating records, but the immediate or ultimate price is often unduly high. Writing in THE LANCET (1914, i., 950), Sir Thomas Oliver mentioned the premature ageing of professional footballers, drew attention to the dangers of sudden overstrain, and continued: "One of the consequences of hard rowing, running, and football playing is an increase in the size of the heart, especially of the left ventricle. While enlargement of the heart may be good enough for the youth of 22 who takes exercise freely, it is not the best for a sedentary clerk of 30. The man of 30 would find himself with more heart than he requires; his circulation would be rather embarrassed than lightened; for it is difficult to tone down the heart to the diminished needs of the economy." The lesson seems to be that excess should as far as possible be left to those who make their living by it, and it is a lesson not without application.

THE MEDICAL OFFICERSHIP OF LONDON COUNTY.

Dr. F. N. Kay Menzies is to succeed Sir William Hamer in January next as chief medical officer for the County of London. The decision was taken by the Council on Tuesday of this week. Dr. Menzies joined the medical department of the Council in 1909, and for the last ten years has identified himself with the organisation of work in connexion with tuberculosis, venereal disease, and child welfare. Eighteen months ago, with the approval of the Council, he succeeded the late Sir Napier Burnett as Director of the Hospital and Medical Services Department at the Red Cross, and two reports have already issued from his pen, showing how the voluntary hospitals of Great Britain outside London may be used to greater advantage and economy. Dr. Menzies was struck with the deficient provision for the treatment of such disorders as ophthalmia neonatorum and infantile paralysis, and he urged hospital boards to acquaint themselves with the particular needs of the area which they serve and especially to consult the general practitioner as to how they may best assist him in the diagnosis and treatment of his patients. It would, he thought, be very unfair for the Hospitals Commission to find a voluntary hospital to be failing in its duty, until it had been definitely established whether the public authorities in that area were doing their duty to those for whom they were legally responsible. He outlined a scheme for a comprehensive survey of existing facilities for the treatment of the sick, with a central bureau of hospital information. This experience and this broad outlook will now be directed towards the solution of hospital problems in London. The time is not long distant when the admirable buildings and equipment of the Poor-law institutions must be fitted into a concerted scheme for the care and treatment of the sick in the metropolis. Anyone who takes a bird's-eye view of London might be surprised to see the extent and the enviable sites of these institutions. Should they come under the jurisdiction of the Council, Dr. Menzies will have an opportunity with which we have every confidence he is competent to deal.

We have already given expression to the sincere regret felt by the very large number of medical men, hygienists, and officials, who have come into relations with Sir William Hamer, at his impending retirement. The blow will be mitigated by the Council's decision to retain his services for a further two years in a consultative capacity. Sir William Hamer entered the service of the Council in 1892 and has thus served the Council continuously for nearly 34 years. One of the most important developments with which Sir William Hamer has been associated has been the growth and organisation of the school medical service. When he took up his appointment in January, 1912, the scheme of medical inspection and treatment was in its infancy. Under his control it has become a far-reaching undertaking, under which every year 300,000 children are medically inspected, the same number are seen by school dentists, over 1,000,000 examinations are made by the school nurses in connexion with the personal hygiene scheme, 230,000 children make 1,500,000 attendances at hospitals and treatment centres, and over 100,000 attendances are made at cleansing stations. The activities of the school medical service during this period have resulted in striking improvements in the health and physique of the children in the schools. On the epidemiological side of his work, the General Purposes Committee of the Council has put on record: "Sir William's researches into the incidence of infectious diseases have made him one of the most distinguished of authorities upon epidemiology. In particular his work upon typhoid fever and upon influenza and its associated group of diseases has furnished a series of brilliant reports to the Council, and has contributed materially both to establish clearer conceptions of the nature of these diseases, and to open up new lines of preventive measures." This is no more than Sir William Hamer's due, for it is rare indeed to find a sanitary officer loaded with administrative duties who yet keeps a mind ever fresh in the pursuit of epidemiological problems. Some of these problems are appreciably nearer solution for his life-work.

AT the Royal Society of Medicine the first Social Evening of the session will be held on Tuesday next, Oct. 27th, at 8.30 P.M., when the President, Sir StClair Thomson, will give a short address on Shakespeare as a Guide in the Art and Practice of Medicine.

AT the Royal College of Physicians of London on Oct. 19th, after delivery of the Harveian Oration by Sir Frederick Mott, the Baly Medal was presented by the President to Prof. R. Magnus, of Utrecht. The Harveian Dinner was held in the evening, Sir Humphry Rolleston presiding. In regard to future arrangements the Bradshaw lecture, by Dr. Edwin Bramwell, on the Myopathies (Nov. 5th), and the FitzPatrick lectures, by Dr. Arthur Shadwell, on Medicine in Ancient Egypt, Assyria, and Palestine (Nov. 10th and 12th), will be delivered at the College, at 5 P.M., on the respective dates. The Lloyd Roberts lecture, by Sir Arthur Keith, on Man's Structural Defects, will be given on Nov. 16th, at the Royal Society of Medicine, 1, Wimpole-street, W., at 5.30 P.M.

COÖPERATION IN HOSPITAL MANAGEMENT.—On the purely business side of hospital management, coöperation is essential from two points of view, as was clearly pointed out by Sir Arthur Stanley in his presidential address to the Incorporated Association of Hospital Officers on Oct. 16th. These two points of view concern the hospital staffs and the subscribing public respectively. The time had come, Sir Arthur Stanley said, when hospitals must be considered to be business concerns, certainly to the extent of their administration and management, and as such they must be conducted upon the lines found to be most efficient in the business world. During the past year the Association had been invited by the King Edward's Hospital Fund to consider and report upon the proposed draft revision of the Revised Uniform System of Hospital Accounts, a revision which all were agreed was essential. Further, he stated that the Council of the Association had been most energetic in their efforts to secure the introduction of a pensions scheme for hospital officers. A concrete scheme was prepared in conjunction with one for nurses by the College of Nursing; with its adoption in London it would spread to the provinces, and they looked forward to the time when there would be one pensions scheme in operation for the staffs of all voluntary hospitals. Thus coördination in hospital management will greatly enhance the harmonious and effective functioning of the hospital system as a whole. Of hardly less importance is the effect of good business management on the subscribing public. The public wants business methods, said the President, because it wants to feel that its money is being efficiently used. A good balance-sheet is perhaps the strongest appeal that a hospital can issue.

Modern Technique in Treatment.

A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.

CLXIV.

TREATMENT OF HYDROCELE, HÆMATOCELE, VARICOCELE, AND SPERMATOCELE.*

III. *Varicocele.*

THE ætiology of the varicose condition of the veins of the pampiniform plexus which is known as varicocele is often obscure, though its more frequent presence on the left side of the body suggests that the right-angled opening of the left spermatic vein into the renal renders its radicles more liable to obstruction than the sloping opening of the right spermatic into the inferior vena cava, and the condition is undoubtedly aggravated in constipated individuals by the drag of the loaded sigmoid colon and rectum, compressing and distorting the left spermatic vein as it crosses the pelvic brim just behind the pelvi-rectal junction. Varicocele may occur secondarily to neoplasms of the left kidney obstructing the venous return into the left renal vein, or to carcinoma of the pelvi-rectal region causing similar congestion, while more rarely retro-peritoneal teratomata or sarcomata may cause varicosity of one or both pampiniform plexuses. In every case, therefore, especially where the history of onset of the varicocele is sudden, the urine should be examined for blood and the abdomen carefully palpated. Should one of these primary causes be discovered it obviously calls for urgent treatment by removal, if possible, when the secondary scrotal condition will certainly improve.

In the majority of cases, however, unilateral varicocele, usually left-sided, exists with no obvious cause, even constipation being absent; and in these cases it cannot be too strongly urged that no treatment is called for unless the condition is causing pain and discomfort to the patient. Unless his attention is directed to it, and his mind disturbed by unfounded tales of danger of impotence if the condition be left untreated, he is rarely troubled by its presence. In some few cases, especially in hot countries and in patients taking riding exercise, if the scrotum be pendulous, pain and a congested feeling result from exertion, and it is then, as also in candidates for the services, where a varicocele may be used as a cause of malingering, justifiable to interfere.

In elderly patients all that is usually necessary is a well-fitted net-suspender to support the scrotum against the perineum; this need be worn only during the day, and is a source of comfort to the patient. Suspenders are not to be recommended in the case of neurotic young men, as their presence tends to concentrate the patient's attention on the genitalia. In those cases where a suspender is ill tolerated, or where the patient is a candidate for one of the services, operation may be undertaken and the main mass of the pampiniform plexus ligated.

Operation.

The pubes having been shaved and purified, the patient is anæsthetised, and a short incision made upwards and outwards from the pubic spine on the affected side so as to expose the spermatic cord as it passes out of the external abdominal ring and down into the scrotum; there is no need to open the inguinal canal by incising the external oblique aponeurosis. The cord is elevated on a retractor, and the fascial sheath around it opened longitudinally, the cremaster muscle-fibres separated, and the vessels exposed. The vas deferens, lying behind the main mass of the pampiniform plexus, should be isolated together with the deferential artery and veins which closely accompany it. The veins are now held up on the retractor and search made for the spermatic artery, with which are usually associated one or two smallish veins; when found this also should be isolated together with the accompanying veins, but no very prolonged search should be made for the vessel, as although its ligation is not desirable, actual atrophy of the testis rarely follows. The remaining veins of the plexus are now dissected clear of the vas and artery for about two or three inches, ligated at the upper and lower limits of the cleared space, and the intervening mass removed, care being taken not to cut them within a quarter of an inch of the ligature for fear of this slipping off. A stitch is now passed through the parts of the veins distal to the ligatures, and these are approximated, a proceeding which holds up the testicle and saves the patient much discomfort and the need of a post-operative scrotal support. I do not consider it necessary to evaginate the testis through a slit in the tunica vaginalis, as the occurrence of a hydrocele of the tunica vaginalis, consequent on the cutting off of the venous return, is so rare if the operation is carried out as described above. The patient should be kept in bed for five or six days, after which he may be allowed up wearing a well-fitting net-suspender, which must, of course, be fitted after the operation. The use of this suspender is a great comfort to the patient for the first fortnight after operation, when its use should be discontinued, except in cases where the patient is indulging in occupations, such as riding or bicycling, where friction occurs to the scrotum and perineum, when the suspender should be worn for at least a month after operation, on all occasions when such exercise is indulged in.

IV. *Spermatocele.*

A further condition of interest in connexion with abnormalities of the scrotal contents is that of spermatocele, a condition usually met with in elderly men and frequently bilateral, the patient's attention being drawn to the presence of an abnormality by a sensation of fullness and discomfort in the testes. The condition arises from the blocking of the ducts of the epididymis, with subsequent distension of the tubules behind, so that one or more rounded cystic swellings occur in the course of the epididymis, usually around the upper and back part of the testes, and may be found to vary in size from a pea to a chestnut; occasionally such a swelling may arise from distension of the vestigial hydatids of Morgagni at the upper end of the testes, in which case they may be seen in younger subjects.

Treatment consists in excision of the thin-walled cysts from the surrounding epididymis, an easy task if no inflammatory reaction is present, the testis being exposed through an inguinal incision as for hydrocele. The tunica vaginalis usually needs incision to expose the cysts, and it is wise to leave it evaginated as described in order to obviate the risk of a hydrocele consequent on the handling at operation. The condition of spermatocele is not in itself dangerous, but removal of the tense cyst causes both physical and mental relief to the elderly patient, and is therefore advisable, although recurrence, usually from formation of new cysts, is by no means uncommon. Operation on both sides is liable to be followed by sterility, though it is somewhat comparable to Steinach's operation in that it is often followed by a temporary improvement in both general and sexual power.

PHILIP H. MITCHINER, M.D., M.S. Lond., F.R.C.S. Eng.,
Surgeon to Out-patients, St. Thomas's Hospital; Surgeon, Royal Northern Hospital, London.

* Parts I. and II. appeared in THE LANCET last week.

NAVAL MEDICAL COMPASSIONATE FUND.—At the quarterly meeting of the directors of the Fund held on Oct. 6th, Surgeon Vice-Admiral Joseph Chambers, C.B., C.M.G., Medical Director-General of the Navy, in the chair, the sum of £124 was distributed among the several applicants.

Special Articles.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

James Mackenzie Institute for Clinical Research, St. Andrews.

AT a meeting of the Institute on Oct. 13th Dr. Douglas Guthrie (Edinburgh) introduced the subject of prognosis in middle-ear suppuration. Though this is known to be a common condition he believed that it was often overlooked. Pus did not flow from the ear in all cases and might be small in quantity so that the disease was frequently undiagnosed. That common type of deafness, otosclerosis, was held by some authorities to be the result of previous inflammation in the middle ear which might have escaped notice. He was convinced that a proportion of deaths attributed to "meningitis" owed their origin to middle-ear disease. In many cases persistent otorrhœa resulted in chronic ill-health, while secondary pulmonary and digestive diseases were common. He alluded to the unsatisfactory terminology in use in regard to otitis media, commenting on the vagueness of meaning of such terms as "acute" and "chronic" and "catarrhal" otitis media, all of which merely represented degrees of the same process. He directed attention to several anatomical features which affected the nature and progress of the condition—e.g., the occurrence of bony pockets in the middle ear, the short, wide, straight Eustachian tube of infants, and so forth. In this connexion he emphasised the danger of common cold in the infant. He referred to cases of unexplained pyrexia in children in which, in spite of a normal appearance of the drum, pus was proved to be present on paracentesis (so-called latent otitis media). The bulk of Dr. Guthrie's paper dealt with the results of an investigation of the subsequent history of 345 cases of otorrhœa over a period of years, which was undertaken on the instigation of the late Sir James Mackenzie. This had proved most illuminating. The ultimate results of various operative procedures as regards life and deafness were illustrated, and as a result of comparison of these it became clear that the more radical forms of surgical procedure should be discarded in favour of more conservative methods. From his figures it was also evident that deafness was more commonly the result of previous middle-ear inflammation than was supposed.

Anderson College of Medicine, Glasgow.

The formal opening of the winter session took place on Tuesday, Oct. 13th, when Mr. Alexander Miles, secretary to the Royal College of Surgeons, Edinburgh, gave an address on Coördination in the Study of Medicine. Mr. Miles pointed out that the purpose of the medical curriculum, as drawn up by the licensing authorities and approved by the General Medical Council, was to qualify men and women for the practice of the profession of medicine as family doctors. In the earlier scientific subjects the student learned something of the great biological, chemical, and physical laws, and by his own observations and experiments was able to verify at least some of them. This paved the way for exact study of the human body, by means of anatomy, physiology, and pathology, with pharmacology as the equipment for treatment of morbid conditions. Hospital work followed with medicine, surgery, and midwifery, and here the student first dealt with the human subject as a sick person. Public health and medical jurisprudence taught him his relations and duties to the community as a whole. On the motion of Prof. Carstairs Douglas, Dean of the College, a vote of thanks was accorded Mr. Miles, who was afterwards entertained to lunch by the governors and staff in the Central Station Hotel.

Edinburgh: Prof. John Fraser's Inaugural Lecture.

Prof. John Fraser, who was appointed Regius professor of clinical surgery at the University of Edinburgh in March of this year on the retirement of Sir Harold Stiles, recently delivered his inaugural lecture in the anatomy lecture theatre of the University. Principal Sir Alfred Ewing presided. Under the title of "De Novo," Prof. Fraser spoke on the course he would wish his education to follow were he given a fresh start, or in other words, on his educational ideals. He said that he had regretfully to confess that with every year the profession of medicine became more of a science and less of an art, and that to keep abreast of the times in medical teaching grew increasingly difficult. In this age of specialisation the medical curriculum made such demands upon the student that there must be specialisation in the preparation for it. The education of the average student when he entered a university was deficient in one vital aspect—he had never been taught the logical processes upon which the acquisition of knowledge was based. The science of induction, observation, elimination of the irrelevant and inference were a closed book to him, or, if he used them, it was as a blind and purposeless instrument which bore no fruit because it was never enriched by the stimulus of purpose. From bitter experience he would say that that was a matter of the most extreme importance. Between man and man there was little material difference where the mental machinery was concerned; it was the manner by which it was worked and the method on which it was treated that spelt the difference between success and failure. He would suggest that the most productive course for the later school years would be a liberal general education, a sufficient knowledge of Latin and Greek to enable the student to understand the etymology of his profession, as perfect a knowledge as it was possible for him to acquire of French and German, and progressively intensified instruction in the basic or natural sciences—physics, chemistry, and biology. On leaving school he considered it a great advantage for a student to take an arts course before embarking on the study of medicine, because, in the words of Sir George Newman, it was "essential to his proper professional education that it should be deeply infused and inspired by the broadest and most liberal culture, from which he may derive mental discipline, the scientific habit, and an intellectual mastery of the principles involved in his profession." Were he again a medical undergraduate, Prof. Fraser said, he would desire to be taught analytically, he would welcome the extended use of the revision and tutorial class, and he would like to see note-taking at lectures abolished, its place being taken by printed synopsis slips distributed the day before. If medicine was once the foster-mother of science, Prof. Fraser concluded, science was now the mother of medicine, and a medical career, preparatory, undergraduate, and postgraduate, must therefore be planned scientifically.

IRELAND.

(FROM OUR OWN CORRESPONDENT.)

The Health of Belfast.

THE annual report for 1924 of the medical officer of health for Belfast is, on the whole, satisfactory reading. The birth-rate was 23·9, a decrease of 1·1 as compared with the preceding year, when the rate was 25·0. The death-rate was 14·3 per 1000, an increase of 0·5 compared with the year 1923, but 2·8 below the average rate for the ten preceding years. Of the total deaths registered, 1948, or 30·78 per cent., were caused by chest diseases, 605 being due to phthisis, 623 to pneumonia, and 720 to other diseases of the respiratory system; 107 deaths of children under 1 year old per 1000 births were registered

during the year. This is an increase of 6 per 1000 compared with the preceding year. Epidemics of scarlet fever and of encephalitis lethargica occurred during the year; 1818 cases of the former were registered with 57 deaths, a case-mortality of 0·44 per cent.; 221 cases of the latter were registered with 30 deaths, a case-mortality of 14·2 per cent. The epidemic of encephalitis lethargica was almost confined to the months of May, June, and July. No case of typhus fever was registered during the year; 44 cases of typhoid fever were registered with 3 deaths. The number of deaths registered during the preceding year was 4, and the average number registered annually during the ten years 1914–23 was 20. The disease, formerly very prevalent in Belfast, is rapidly dying out, due mainly to the city's excellent water-supply. The various health services have been well maintained. Maternity and child welfare work has been steadily developed. There were six centres in operation during the year. The number of babies medically examined was 2239, and the total number of attendances at the centres was 29,903. This work is progressing in a satisfactory manner, and its utility is becoming more and more recognised. Infant mortality remains too high, though there has been a marked decline in the last 20 years. The figure in 1904 was 154, and in 1905 it was 136, compared with 101 in 1923 and 107 in 1924. It is worthy of note that the birth-rate has fallen from 33·4 per 1000 in 1881 to 23·9 per 1000 in 1924.

Royal Victoria Hospital, Belfast.

The opening address of the present session was delivered in the King Edward Hall of the hospital on Oct. 15th by Prof. C. G. Lowry, who recalled the history of the hospital, its large developments in recent years, and the rapid growth of the Belfast Medical School. He emphasised the great importance of clinical studies, and expressed the opinion that the three years allotted to these studies were insufficient. The medical student should remember the motto of Sir Spencer Wells, "Do to-day's work to-day," and the words of Sir William Osler, "Do the day's work well, and take no thought for to-morrow." Carlyle had admonished them "not to see what lies dimly at a distance, but to do what lies clearly at hand." The lecturer stressed the importance for the student of taking careful clinical notes, which should be brief. It had been well said that "to study the phenomena of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all." The lecturer urged the importance to the student of the study of medical biography. It was not fitting that the medical student should know the name of Donoghue's Derby mounts but know nothing of Dupuytren or Dover, or be more familiar with the names of Lenglen and Lacoste than those of Lister and Laennec. The memoirs of Sir James Paget and of Pasteur were to be specially commended. They formed a medical and scientific history of the greatest period of progress in the history of mankind—the Victorian era. Those who were beginning their clinical studies at the present time were fortunate. Their art was at a most interesting period of its development. During the past quarter of a century there had been great advances in the knowledge of bacterial infection, venereal diseases, disorders of metabolism, X ray diagnosis, the art of anæsthesia, and the technique of surgery and obstetrics. Some of them might see the conquest of malignant disease, the elucidation of cardiovascular degenerations, and a reduction in maternal mortality in childbirth. Where the vanguard camped to-day, the rearguard would rest to-morrow. Let them always remember that courage, discipline, and perseverance were the keys to success in life.

A memorial tablet to the late Dr. J. W. Mullen has been placed in the Ladywell Sanatorium, Eccles New-road, Salford. Dr. Mullen was medical superintendent of the institution for 42 years.

PARIS.

(FROM OUR OWN CORRESPONDENT.)

The Safety of Railway Travellers.

THE Academy of Medicine recently received a communication from the managing committee of the French railways asking whether the Academy had ever passed a recommendation dealing with the protection of travellers against accidents, in so far as such protection lay within the province of medicine. It appears that the Academy issued only one such recommendation in 1922, and that dealt merely with urban traffic, particularly motor omnibuses. During the last few years the number of trains, especially of express trains, has increased, and the heavy demands on the working staff calls for employees of the best type, with first-class eyes and ears, and who are decisive and quick in judgment. Alcoholism is now on the increase, and although the incidence of syphilis has apparently diminished since 1918, there is at the present time a likelihood of some increase of general paralysis of the insane, for syphilis, although promptly and efficaciously treated, was rife during the war. It is of prime importance that responsible employees such as guards, signalmen, and pointsmen, should be selected with care, and be examined exhaustively as regards their mental and physical equipment. The Academy has therefore nominated a commission, on the proposal of Dr. Maurice de Fleury, consisting of a medico-legal expert, two surgeons, a cardiologist, a neurologist, a psychiatrist, an oto-rhino-laryngologist, and an ophthalmologist. The value of the ophthalmologist is very great, for apart from testing the visual acuity of those, such as engine-drivers, in whom it is a sine qua non, he may be the first to detect the presence of an Argyll Robertson pupil, and thus be led to suspect an early affection of the central nervous system.

Hydatid Cysts of the Pancreas.

MR. AUVRAY recently made a communication to the Academy of Medicine on a case which had come under his observation, the pathological interest lying in its rarity. Very few cases of hydatid cyst of the pancreas are recorded in medical literature. Dr. Vegas and Dr. Cranwell, of Argentina, record one instance of pancreatic cyst among 1700 cases of hydatid cyst, and Teichman, in a total of 2452 echinococcus cysts, found 3 in the pancreas. Dr. Villar, of Bordeaux, described in a paper read in 1905 before the Surgical Congress some 13 cases; 6 were discovered post mortem and 7 were operated upon. In 1912 Hauser collected 28 cases, of which 11 had been operated upon with 1 death, and 17 were revealed post mortem. Since Hauser's work 6 cases have been recorded, which brings the total, including Auvray's case, up to 35, of which 17 were diagnosed and operated upon. Distinction must be drawn between cysts originating in the pancreas and those which, arising elsewhere, come into association with that organ by contiguity. Six cases of the latter variety are included in the above statistics. Cysts in the tail of the pancreas are quite exceptional; the majority develop at the level of the head.

Surgical Treatment of Angina Pectoris.

Dr. Danielopolu and Dr. Marcu, of Bucharest, communicated to the Academy of Medicine the results of their observations on the modification of the electrocardiogram caused by excision of the stellate ganglion after ligature of the coronary arteries. When the myocardium has been weakened by occlusion of the coronaries, the excision of the stellate ganglion causes modifications of the electrocardiogram which are of very serious clinical import. Bearing in mind that by the excision of the stellate ganglion the majority of motor nerve fibres and certain coronary vaso-motor fibres are put out of action, and comparing experimental results with the frequently fatal phenomena of myocardiac insufficiency

caused by removal of the ganglion, it must be concluded that this surgical procedure may be dangerous in many cases of angina pectoris. The researches of the two Roumanian doctors show that while the excision of the first thoracic ganglion produces important effects on the electrocardiogram, removal of the superior cervical ganglion effects no change. This fact proves that the modifications following excision of the first thoracic ganglion are caused by the blocking of the cardiac motor fibres. Jonnesco's operation consists in the removal of the stellate ganglion along with the cervical sympathetic; but the clinical and experimental results of Danielopolu and Marcu, along with operation results already recorded in medical literature, lead to the conclusion that the stellate ganglion should not be interfered with in this condition. The operation proposed is as follows: excision of the cervical sympathetic, leaving the superior cervical ganglion and the first thoracic ganglion, resection of the vagus and all its branches which supply the thorax, resection of all the rami communicantes uniting the inferior cervical ganglion and the first thoracic ganglion to the lowest cervical nerves and the first dorsal. The advantage of this operation is that while a large number of cardio-aortic sensory fibres are resected, the important afferent fibres which pass through the stellate ganglion remain unimpaired.

Conference on Hereditary Syphilis.

Speaking at a dinner held in connexion with the conference on hereditary syphilis, Mr. Durafour, Minister of Labour, Hygiene, and Social Welfare, stated that every year in France syphilis caused 40,000 abortions, 20,000 deaths among infants, and 80,000 deaths among adults. Moral progress, however, has taken place, he said, and syphilis is no longer regarded as a disease to be hushed up. As regards treatment, every day brought forth some new remedy. The campaign was becoming organised, but the State could not at present grant more than 4 million francs annually for this purpose, and there were only 450 organised centres in France.

An Index of Scientific Journals.

Although Paris abounds in large and rich libraries, it is often a very difficult matter for the research worker to know just where is filed the special scientific journal he seeks. Thanks, however, to Mr. Alfred Lacroix, permanent secretary of the Académie des Sciences, this difficulty has been removed. He conceived the idea of compiling a general inventory of the scientific journals available in the Paris libraries, indicating where each journal could be consulted. The first section of this index appeared last year, and the second, from M to Z, has just been published. The journals are classified alphabetically according to the first letter of their titles. With the help of MM. Léon Bullingaire and A. Richard, Mr. Lacroix has collated more than 17,000 journals, defunct or extant. A third section of the work will be published in a few months, containing geographical and analytical tables, to assist the inquirer who is not sure of the exact title of the journal he requires. The index is on the same lines as, but of wider scope than, the excellent index which Prof. Leiper has dedicated to those who have made the weary pilgrimage of your London libraries.

BERLIN.

(FROM OUR OWN CORRESPONDENT.)

Visit of Spanish Medical Men.

A PARTY of leading Spanish medical men recently visited the medical institutions of Germany. They travelled from Cologne and Hamburg to Berlin where, notwithstanding the holidays, a special meeting of the united medical societies was convened in their honour, Prof. Kraus, President of the Berlin Medical Society, being in the chair. The Dean of the Berlin Medical Faculty and President of the Pathological Society, Prof. Lubarsch, welcomed the guests in a Latin address; Prof. Ferran, of Madrid, read a paper on the mutation of the Koch bacillus and the prophylactic vaccination of children against tuberculosis which had given favourable results. A report on the study of medicine and scientific research in Spain was given by the leader of the Spanish medical men, Prof. Rosell, of Barcelona. The party then visited the home for tuberculous children, the infants home, the Westend and Virchow Hospitals, and the Robert Koch Institute. Although a great number of medical men were away on holidays the meeting was well attended, as was the dinner at which the Spanish doctors were entertained before they left Berlin for Munich.

A Plea for Modern Dress.

The modern fashion in dress has been the subject of many and severe criticisms in this country by moralists, women's associations, and the clergy of every religious denomination because of its alleged indecency. Prof. Friedberger, of Greifswald, however, has taken up the cudgels on behalf of the modern girl, for, speaking as a hygienist, he has recently stated that modern fashions for women are almost ideal and in every respect preferable to male attire. The modern fashion not only allows free access of air and light to the body, but it has an educational influence by compelling women of every class to extend their ablutions beyond the hands and face. The advantage of the modern shoe, which only covers the heel and the toes, leaving the other parts of the foot free, is that the perspiration evaporates easily. Short frocks and very thin stockings of porous material expose the legs to the salutary influence of the sun and the air, while arms, neck, and shoulders, which have no cover at all, benefit in proportion. The "bobbed" or "shingled" coiffure, which has replaced the former fashion of wearing great masses of hair and artificial tresses, together with the light modern hat made of thin straw or felt, leads to good ventilation of the head. With the disappearance of the corset chlorosis has become almost unknown among the rising generation. Chills are less frequent in women than in men. The dress of men, notwithstanding the increased amount of physical exercise now taken, has not undergone such a radical revolution as that of the female sex. It is true that the high collar and the starched shirt have disappeared except for evening dress and that shoes have taken the place of boots, but the high waistcoat still exists. Prof. Friedberger makes proposals for reform which, however, will probably not meet with the approval of fashionable circles. Instead of long trousers, breeches should be generally worn in summer, as is already the mode for sporting purposes. A combination of shirt and pants similar to that worn by ladies should become the rule. A collar, even a soft one, Prof. Friedberger holds, is highly unhygienic and should be replaced by a sort of decolleté. Sporting dress should be generally worn in offices and for visits. Prof. Friedberger found that the dress of his assistant weighed 3229 g., while his wife's clothes weighed only 741 g. There is no reason why in an office the clerks should wear dress which is five times heavier and 20 times less hygienic than that of their lady colleagues.

A Penholder in the Abdominal Cavity.

Before the Surgical and Gynæcological Society of Hamburg Dr. König showed the case of a woman, 42 years of age, who had had several normal births and miscarriages. The last normal birth had happened one year ago. In the spring of this year a miscarriage had occurred and a putrid fœtus was removed by a medical man. She was conveyed with high fever to the Hamburg General Hospital where, besides the symptoms of abortion, a tumour of the uterus was found. It was believed that a myoma of the uterus infected by the septic abortion was present and the uterus accordingly removed. In the course of the operation, however, a piece of vulcanite penholder,

4 cm. in length, was found between the bladder and the uterus. The woman admitted that she had introduced the penholder into the uterus four years ago to produce abortion. The penholder had obviously penetrated the wall of the uterus into the peritoneal cavity. It is remarkable that a foreign body remained within the peritoneum for four years without producing any symptoms and without preventing subsequent normal births until it was detected in the course of an operation.

A Curious Verdict.

A well-known alienist had been asked by the family of a patient to give a certificate of insanity for the purpose of a divorce. He did so and charged a fee of M.1000 (£50), which was paid. As the certificate was eventually not required in the suit, the family asked the medical man to refund part of the fee, which he, of course, declined to do. The family accordingly prosecuted the medical man before the special Anti-Usury Court, alleging that the sum charged was too high. The defendant pleaded that the case had been a specially complicated one, that he had to examine the patient on three occasions for several hours at a time, and that his certificate was based on scientific deductions. In spite of these facts the court gave a verdict against the defendant because the fee was held to be not in accordance with the service rendered, and that the case thus fell under the Anti-Usury Act. The medical man was condemned to refund M.700, and moreover, in addition a fine of M.150 (£7 6s.) for usury was imposed. This verdict has aroused much interest because the provisions of the Anti-Usury Act are directed against overcharging for food, clothes, and other necessaries, and therefore according to this ruling a medical certificate falls into a category that appears a little strange.

PUBLIC HEALTH ADMINISTRATION.

ADMINISTRATIVE MACHINERY.*

(*Continued from p. 773.*)

IX. JAPAN.

THE Empire of Japan covers an area of 236,000 square miles and has a population of 80 million (339 persons to the square mile). There are four large islands and over 4000 small ones.

Central Health Organisation.

The first body created in Japan for sanitary administration on a scientific basis was the medical bureau which was established at the Department of Education in 1873. Before this time there were hardly any health regulations; the "Medical Code," which was drafted in the following year, was the first unified medical statute. In 1875 the bureau was transferred to the Home Department, and since then the Ministry of Home Affairs has been responsible for the health services. The Sanitary Bureau, as it is now called, manages all the general sanitary administration except industrial hygiene, which comes into the sphere of the Bureau of Social Work. It is divided into a public health section, a medical section, and sections for the prevention of chronic and of acute infectious diseases. There are 19 members of the staff of the bureau under a director, and there are another 19 officers who act in a temporary capacity as experts. These figures include clerks. School hygiene is in charge of the Ministry of Education; the Navy and War Departments also have medical bureaux, whilst railway and prison sanitation come under the control of the Ministries of Railways and Justice. Besides these administrative bodies there are three advisory councils—namely, the Central Board of Health, the Council for the Investigation of the Japanese Pharmacopœia, and the Board for the Investigation of National Hygiene. The principal function of these bodies is to frame advice in response to inquiries made by the administrative departments, but they may put forward their views without being consulted. The Board for the Investigation of National Hygiene, which is under the chairmanship of the Minister for Home Affairs, is not a duplicate of the Central Board of Health, but is occupied in considering new measures which may be required by the unsatisfactory state of the public health. The Central Laboratories include the Infectious Diseases Investigation Institute, attached to the Imperial University, which manufactures sera, vaccines, and the like; the Hygienic Laboratories at Tokio and Osaka, which are responsible, amongst other things, for the examination of drugs; and the Research Institute of Nutrition. All of these are under the supervision of the Home Department.

Local Health Organisation.

The provincial bodies for sanitary administration are the local governors, chiefs of police stations, and chiefs of cities, towns, and villages, in addition to custom house and port quarantine authorities. In provinces the governors are the highest officials, and under them are the police departments in which are established sanitary sections to take charge of health affairs. To each of these sanitary sections experts of various kinds and a laboratory are attached. In the Tokio prefecture responsibility for sanitary administration is divided between the Governor and the Inspector-General of the Metropolitan Police, but it devolves mainly on the latter, and there is a sanitary department in the Metropolitan Police Board. The intermediate provincial authorities in Japan are the heads of subprefectures and the chiefs of police stations. As a rule, however, sanitary affairs are supervised by the chiefs of police stations, who generally have jurisdiction over subprefectures and cities, and look after health conditions therein. Cities, towns, villages and their heads have also public health responsibilities of their own, in accordance with the laws and regulations. Most cities and towns have a sanitary department and a hygienic laboratory, but in villages certain officials represent the whole health organisation. There are six ports with permanent health quarantine organisations, and the customs authorities take charge of the procedure. If temporary quarantine is needed provisional quarantine stations may be set up, and these come under the supervision of the local governor and the immediate charge of the chief of the police department of the prefecture concerned. Rural sanitation has been very elementary, and measures are being devised for its improvement on the basis of elaborate investigations which have been undertaken; but these are still incomplete. In large cities there are municipal disinfecting stations, which despatch sanitary squads for domestic disinfection. In the villages the work is undertaken by the local sanitary official, and there are lecture courses for such persons to instruct them in the work. There are regular factory inspectors attached to the staff of local governors, and a great many private organisations are interested in improving industrial conditions.

Hospitals, Schools, and Training.

Hospitals are at present controlled by the regulations of the local prefectures rather than those of the Minister. At the end of 1913 the available beds were accounted for as follows: general hospitals—public 7628, private 48,884; hospitals for infectious diseases, 25,037; isolation wards, 74,910; and hospitals for licensed prostitutes, 5000 beds. (In Japan there were over 50,000 licensed prostitutes in 1923.) The total number of beds available for tuberculosis was about 3000 in 1923, and for leprosy about 5000. The care of *schools* is in charge of the Section of School Hygiene in the Ministry of Education, and there are specialists attached to each prefectural local government. Public schools appoint school physicians,

* Based on a Series of Reports on National Health Organisation to the Health Section of the League of Nations. Obtainable in Great Britain from Constable and Co.

who act under the instructions of the central authorities, and private schools are following this example. Nurses are frequently employed as well. There are many training schools for *medical practitioners*, and the total number of these was over 43,000 in 1923 (7·36 per 10,000 of the population). The examinations for a practising diploma include the subject of hygiene. Midwives are required to pass an examination or take an approved course lasting two years, and there are about 40 schools of midwifery. At the end of 1923 there were over 39,000 midwives. Nursing is governed by similar regulations, but not more than one year's training is needed before application can be made to the local governor for permission to practise. There are also regulations dealing with acupuncture and moxa-cauterisation, for the practice of which four years' study is required. Much attention has recently been given to *health propaganda*, which is carried on by pamphlets, cinemas, lectures, and exhibitions, and by voluntary organisations, and there is a *Health Insurance Act*, which compels insurance by workers employed under the Factory or Mining Acts, provided that their income is below a certain figure.

Statistics are collected by the Public Health Section of the Ministry for Home Affairs.

THE LONDON MEDICAL EXHIBITION.

(*Concluded from page 831.*)

LAST week an account was given of exhibits classified broadly under the heading of Drugs and Foods. We now deal with the following exhibits: Instruments and Appliances, Spas and Waters, and Medical Publishers.

INSTRUMENTS AND APPLIANCES.

Among the large assortment of surgical instruments and appliances shown by MAYER AND PHELPS (Chiron House, 59/61, New Cavendish-street, W.), much interest was taken in the artificial larynx for use after complete extirpation of the larynx, and in the Yates set of instruments for exploration of the nasal sinuses. A new jack for Davis's gag was also shown, and the Reavell-Moseley Electric Rotary Pump for pressure and suction was examined with interest by a large number of visitors.—DOWN BROS., LTD. (21 and 23, St. Thomas's-street, S.E.), showed surgical instruments and appliances in wide variety, many of them being made in stainless steel. The exhibit included the "Up-to-Date" Operation Table with oil pressure pump for raising and lowering, Carruther's Saline Infusion Apparatus, and Keynes' Blood Transfusion Apparatus.—JOHN WEISS AND SON, LTD. (287, Oxford-street, W.), who make a feature of rustless steel, had a good display of general surgical instruments and consulting-room lamps, and drew particular attention to May's electrical ophthalmoscope.—HOLBORN SURGICAL INSTRUMENT CO., LTD. (26, Thavies-inn, E.C.), covered a wide range of surgical instruments and appliances, including Blair Bell's vulva retractor, Cumberbatch and Robinson's diathermy electrodes, mouth gags, urethroscopes, stainless steel forceps and trocars, ophthalmoscopes, auroscopes, bone drills, and so forth.—The GENITO-URINARY MANUFACTURING CO., LTD. (64, Great Portland-street, W.), in addition to a comprehensive exhibit of instruments for bladder and kidney surgery of the latest pattern, prominently exhibited instruments for bronchoscopy and œsophagoscopy, together with diathermy apparatus and apparatus for use in the treatment of venereal disease.—SURGICAL MANUFACTURING CO., LTD. (83 and 85, Mortimer-street, W., and at Glasgow, Belfast, Dublin, and abroad), exhibited medical and surgical apparatus and appliances of many kinds, together with weighing machines, couches, and sterilisers, and made a prominent feature of the Barton Sphygmomanometer.—SCHOLL MANUFACTURING CO., LTD. (1–4 Giltspur-street, E.C.), displayed in great variety foot supports and appliances for the relief and correction of acquired foot troubles, and DE VILBISS CO., LTD. (West Drayton, Middlesex, and 27, Old Bond-street, W.), a collection of medical sprays, some of which have a convenient adjustable tip.

One of the features of ALLEN AND HANBURYS, LTD. (37, Lombard-street, E.C.), large exhibit of surgical instruments and accessories was the St. Bartholomew's Hospital Pattern Operation Table with several important improvements. Among exhibits attracting particular attention were a motor blower and suction apparatus which can be run off any current, is portable, and is comparatively silent in working, and a transformer and resistance which is economical in working and can be used for many purposes. Mercury-vapour arc lamps were shown in operation and the use of the carbon arc and tungsten arc were also demonstrated.—Another firm making a special feature of artificial light treatment was GENERAL RADIOLOGICAL AND SURGICAL APPARATUS CO., LTD. (Incorporating M. Schaerer, S.A.) (204/6, Great Portland-street, W.), who showed many forms of X ray and artificial light apparatus. A powerful high-tension transformer of small dimensions called the "Peo" for use with all types of Coolidge tubes and gas tubes attracted attention, as did also the Artificial Mountain Sun Quartz Lamp, constructed to work successfully from alternative current direct. A combined couch and screening stand was also shown, and many other useful appliances. The Model X de Quervain Operation Table fitted with pump action allowed every possible position to be obtained with little exertion on the part of the operator or his assistant.—T. CLARK AND SON (69, Marylebone-lane, W.) exhibited many forms of ultra-violet ray lamps and demonstrated economical methods of using the tungsten arc. One lamp was designed for treating five children at a time with five-minute exposures. Among other apparatus of this kind attracting attention was a bath for the whole body, fitted with six lamps. The patient is enclosed by means of curtains fitted with windows that cut off the ultra-violet rays from the operator.—X RAYS, LTD. (incorporating F. R. Butt and Co., Ltd.), 11, Torrington-place, Gower-street, W.C.), drew attention to a "New" X ray outfit especially designed for cottage hospitals, nursing homes, and for general practitioners. It occupies the space of an ordinary wardrobe, is entirely self-contained, and has one control switch only. Lamps for sunlight treatment were also prominently exhibited.—KODAK, LTD. (Kingsway, W.C.), had an interesting exhibit of "Dupli-Tized" X ray films and negatives and prints demonstrating the utility of the photographic materials made by this firm.—"RADIO-COIL" ELECTRO MAGNETIC BLANKET, LTD. (4, Manchester-street, Manchester-square, W.). The appliance shown by this company consisted of a blanket the surface of which is covered by parallel spirals of wire joined in series through which an electric current can be passed. The voltage is controlled by a resistance. A specially constructed pad containing a coil of wire can be used in conjunction with the blanket to intensify the treatment at local spots. Many claims are made for this appliance in the treatment of acute and chronic diseases which can only be confirmed by trial.

CHAS. HEARSON AND CO., LTD. (68, Willow-walk, Bermondsey, S.E., 27, Mortimer-street, W., and 24, Fenchurch-street, E.C.), in addition to a wide display of biological apparatus, made a prominent feature of a new dark field condenser, combined with an arrangement for giving transmitted light, devised by Prof. L. Arzt, of Vienna. This takes the place of the ordinary condenser and can be fitted to any microscope. Reichert microscopes were also shown with combination monocular and binocular eye-tubes, the change being made by the turn of a screw. A feature of these microscopes is that they approximate in height to the monocular instrument. Another microscope of unusual interest can be affixed to a wall by a bracket, universal joints enabling the instrument to be directed to the eye, skin, or other special part of a living subject.—HERBERT E. KENDRICK (342, St. John-street, E.C.) exhibited several kinds of metabolism and blood chemistry apparatus, special prominence being given to Benedict Portable Metabolism Apparatus, designed for completing metabolism tests at the patient's bedside without analysis; the Clinical Colorimeter, for the estimations of uric acid, urea, creatinine, and sugar in the blood; and the Clinical Blood-Sugar Outfit, designed for blood-sugar determinations by medical practitioners who lack the time and convenience for preparing the solutions and putting together the necessary apparatus.—HAWKSLEY AND SONS (83, Wigmore-street, W.) showed a wide selection of sphygmomanometers, blood diagnostic instruments, recording instruments of several kinds, blood-urea apparatus, and ophthalmoscopes. The outfit for injection of insulin, as suggested by Prof. H. MacLean, was also shown, as well as the cabinet model Baumanometer standard blood-pressure apparatus.—TINTOMETER, LTD. (Colour Laboratories, Salisbury), who are the sole makers of the Lovibond patents and apparatus for colour analysis, included in their exhibit Dr. Dudley Corbett's Radiometer for use with Sabouraud's and other pastilles, a new and improved form of Oliver's Hæmoglobinometer, and Major H. St. A. Agate's Red Cell Suspensionometer.—SHORT AND MASON (Macdonald-road, Walthamstow, E., and Atlantic House, Holborn Viaduct, E.C.) showed portable and surgery types of sphygmomanometers, clinical thermometers, as well as the thermograph recording thermometer and the micro-barograph, which records most minute changes of atmospheric pressure.—G. H. ZEAL, LTD. (75 and 77, St. John-street, E.C., and St. John's-lane, E.C.), exhibited their well-known and reliable clinical thermometers, some of them designed

with the special objects of facilitating re-setting, easy sterilisation, and easy reading of the index.—BRITISH WOLMUTH SANAWAVES CO., LTD. (25, High Holborn, W.C.), demonstrated apparatus for electro-galvanic treatment, the INHALING DRUG AND APPARATUS CO. (30, Grosvenor-place, S.W.) exhibited an apparatus which enables any drug to be transformed into an exceedingly fine vapour, W. J. WILSON AND CO. (2b, Hand-court and 45, Bedford-row, W.C.) showed artificial limbs, hospital furniture, and radiant heat lamps, and PEDESTROS, LTD. (Roehampton House, Roehampton, S.W.), had a comprehensive display of the latest types of light artificial limbs.—RELIANCE RUBBER CO., LTD. (212/213, Upper Thames-street, E.C.), displayed rubber goods made by a new process which gives high tensile strength and great durability, and A. G. SHELDON and CO. (59, Weymouth-street, W.) exhibited sterilised surgical dressings and accouchement outfits in sealed tins.—The "QUICKSEY" CABINET MANUFACTURING CO. (10, Cromwell House, Fulwood-place, W.C.) showed medical cabinets for consulting rooms and other purposes.—H. E. CURTIS AND SON, LTD. (7, Mandeville-place, W.), showed a wide assortment of belts for surgical purposes, including the well-known abdominal and colostomy supports. The Curtis abdominal support is an admirable appliance for abdominal ptosis, for the protection of abdominal scar tissue during consolidation, for mobile or displaced kidney, and for different forms of umbilical and ventral hernia. This firm also exhibited Kaylene, a colloidal hydrated silicate of alumnia and Colonol, a liquid paraffin of extra high viscosity.—DOMEN BELTS CO., LTD. (456, Strand, W.C.), exhibited belts, bandages, and supports for pregnancy, accouchement, gastroptosis, umbilical hernia, and floating kidney.

Appliances for the deaf were shown by "ARDENTE-ACOUSTIQUE" (95, Wigmore-street, W.) who had a wide range of different types of "Ardente-Acoustique" aids for the deaf which in their improved form are smaller and lighter than hitherto. A feature of these instruments is their inconspicuousness and their perfectly natural tone, reverberation and metallic sounds being practically absent. There is a special type for use in public buildings, while the types for personal use number 30. A special stethoscope for deaf doctors was demonstrated, and the attention of medical men was called to the fact that instruments are always allowed to be tried in their homes by patients.—GENERAL ACOUSTICS, LTD. (77, Wigmore-street, W.), displayed many electrical and non-electrical aids for the deaf. This firm supply the Acousticon for multiple installation for use in churches and in large gatherings. A point is made of the fact that patients are permitted to have the instruments on trial.—W. H. PETTIFOR (11, Victoria-street, S.W.) showed a large range of electrical aids for the deaf and a test instrument for estimating the most suitable pitch, sound-wave form, and volume of sound for each individual case.

GAS LIGHT AND COKE CO. (Horseferry-road, Westminster, S.W.) demonstrated radiant gas stoves and fires, showing at the same time the advantages of gas over coal in regard to atmospheric pollution.

SPAS AND WATERS.

The attractive display by some of the principal spas and watering-places of this country indicated a growing activity among our balneological centres. Unfortunately the advantages of British spas in the matter of treatment is too frequently overlooked, while in these days of enforced economy travelling expenses necessitated by a visit abroad are items of importance. The demand, too, for spa treatment for insured persons added interest to the exhibits.

All the British spas advertised their advantages both for treatment and recreation by photographs, books, and pamphlets giving an analysis of the waters, the technique of particular treatments, and the organisation of the establishments. BATH provides for every form of balneotherapy and electrotherapy. The hot springs are the only ones in Great Britain which rise at a natural temperature of 120° F., and they yield every day half a million gallons of the most highly radio-active mineral water in this country.—BUXTON has radio-active thermal waters at 82° F., and one of the strongest chalybeate springs in Great Britain. The thermal water emerges from the limestone rock by nine springs, which are identical in temperature and composition.—DROITWICH, a natural brine baths spa, is a summer and winter resort which has many attractions, is sheltered from cold winds, and the brine which is supplied from springs 200 ft. below the town is about ten times the strength of the ocean. The treatment consists of baths and douches, in some cases in combination with massage either given under the spray in the form of massage douche baths or administered in the form of dry massage.—HARROGATE has 87 springs, of which 16 are used internally, and all continental methods of treatment are available in addition to special treatments originating at this spa. Latest developments include a nose and throat department and the ultra-violet ray treatment.—TORQUAY, which has an equable climate, has available 60 different treatments and is equipped with all the latest appliances. Special features are the seaweed baths for muscular and articular rheumatism and the Dartmoor peat baths and packs.—Messrs. INGRAM AND ROYLE, LTD. (Bangor Wharf, 45, Belvedere-road, S.E.), importers and exporters of natural mineral waters, salts, and pastilles, prominently displayed their bottled Vichy Célestins, Evian-Cachat, Carlsbad, Hunyadi Janos, and other waters. A pamphlet issued by this firm shows how the Contrexéville cure can be continued by the patient at home.

MEDICAL PUBLISHERS.

Medical books were shown by:—

ADLARD AND SON AND WEST NEWMAN, LTD. (23, Bartholomew Close, E.C.); BAILLIÈRE, TINDALL AND COX (8, Henrietta-street, W.C.); WILLIAM HEINEMANN (20, Bedford-street, W.C.); H. K. LEWIS AND CO., LTD. (136 and 140, Gower-street and 24 and 28, Gower-place, W.C.); and STANLEY PHILLIPS (45, Brondesbury-road, N.W.).—The FOOD EDUCATION SOCIETY (24, Tufton-street, Westminster, S.W.) made a feature of books and pamphlets on food cookery and hygiene, notable among them being a series of little books entitled "Facts for Patriots," dealing with the physiological and economical uses of food. These books deserve a wide publication.

The LANCASHIRE AND GENERAL ASSURANCE CO., LTD. (Lancashire House, 8, Bucklersbury, E.C., and Oxford, Cambridge, and London), made a special feature of their Comprehensive Medical Policy at a premium of £20 per annum, covering a complete medical indemnity with an unlimited amount for damages and cost, sickness and accident, motor-car, contents of house with full protection for servants under the Workmen's Compensation Act, and against other liabilities.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Lt. (D) L. M. Hughes to the *Impregnable*, tempy.

ROYAL ARMY MEDICAL CORPS.

ARMY RESERVE OF OFFICERS.

Maj. E. N. Graham, late Malay States Volunteer Res., to be Maj.

TERRITORIAL ARMY.

Lt. B. G. Thompson resigns his commission.

TERRITORIAL ARMY RESERVE OF OFFICERS.

Capt. H. M. Brown, from the Active List, to be Capt.

ROYAL AIR FORCE.

Flying Officer W. J. Hutchinson is transferred to the Reserve, Class D2.

INDIAN MEDICAL SERVICE.

Capts. Bankim Behari Das and Ram Chand Mahajan relinquish their tempy. commns.

The King has approved the retirement of Maj. A. G Coullie.

LECTURES ON HYGIENE TO CADETS.

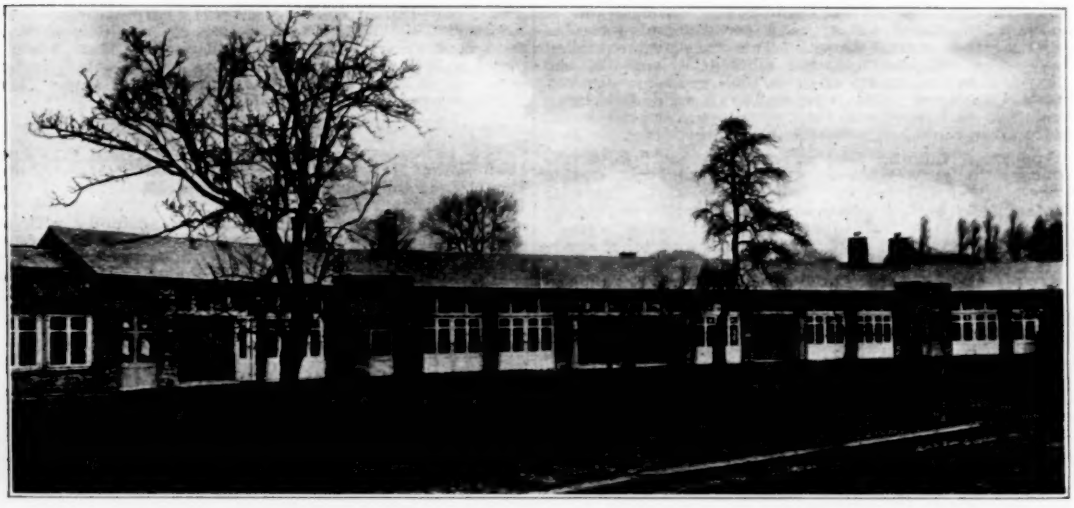
A course of lectures on hygiene and sanitation are to be given in each term to the cadets of the Senior Division at the Royal Military Academy and the Royal Military College by an officer nominated by the Director-General, Army Medical Services.

ROYAL PORTSMOUTH HOSPITAL.—The enlargement of this hospital has become so urgent that the governors have appointed a special committee to consider the whole question of further hospital accommodation in Portsmouth. Dr. Scott Ridout states that the waiting-list includes 19 cancer patients. Meanwhile an endeavour is being made to purchase a small property on Portsdown Hill for the provision of a convalescent home for children. It is believed that by the erection of simple chalets accommodation can be found for 50 children at a time.

THE MANCHESTER BABIES' HOSPITAL.

THE new buildings of the Manchester Babies' Hospital were opened on Oct. 19th by the Earl of Derby.

The hospital began its career in 1914, on the first day of the war, in a semi-detached house which accommodated 12 infants and the nursing staff. By 1918 it was already recognised as a useful training centre for welfare workers and the number of patients had risen to 30, all of them under 1 year of age. The transfer of the work to the grounds of Cringle Hall, Levenshulme, in 1920 was a further step in the desired direction, and it is here that the new buildings have been put up which will go far towards realising at last the ideals of the founders. The objects of the hospital as it now stands are three: to give institutional treatment to babies suffering from disorders of nutrition, including epidemic summer diarrhœa and rickets; to train girls in the care of infants; and to give opportunities for research into disorders of nutrition. The new arrangements are the fruit of much anxious thought and study, and they should provide a hospital which will be a model for others. Cringle Hall itself is to be used as an administrative block and for the accommodation of the three nursing mothers who supply breast milk for use in the wards; an adjoining house called Northbrook has been bought as a nurses' home, whilst the new block, which is illustrated above, is designed for the 80 patients. Twenty of these will be children below 2 years of age who are suffering from rickets or some other nutritional disorder.



The Manchester Babies' Hospital: The new wards before completion.

The wards, ten in number, are on the ground floor, and the central four face due south. Running to south-east and south-west at an obtuse angle to one another are two large wards, and each of these ends in a smaller ward and a sun parlour whose walls and roof are mainly of glass. In a sheltered angle are two smaller rooms intended for specially delicate or premature babies, and the fronts of the wards are made with doors that fold back, so that in summer they will actually be open-air verandahs. The east and west wards have large windows behind, but to the rear of the central wards runs a corridor and on the other side of this are the bathrooms, two at each end, with the diet kitchen and dispensary in the centre. The wards are divided into units of 20 beds, and for each 20 is supplied a bathroom and changing room and large ward store cupboards, the whole being so arranged that any ward and its service can be completely isolated from the others. The divisions between the wards are of glass, and the whole length of the building can thus be easily supervised. Two baths are supplied for each 20 infants, and these baths are specially designed and fitted with spraying tables. Attached to the wards is a block containing a small laboratory and an X ray room with equipment for electrotherapy and massage.

Along the front of the hospital and at each end run concrete terraces so that the cots can be wheeled out into the sunshine; around these are lawns, with a few shady trees, and the building itself, as should be clear from the description, is specially adapted for open-air treatment. At some distance away a temporary house, with three small rooms and a bathroom, has been fitted up for the isolation of infectious cases for observation. A covered corridor connects the new block with the main building, and in this is a dining-room for the nurses and a large room for use as a library and doctor's office, where lectures may be given. Here also are the quarters of the resident medical officer and the matron, the board room, and the secretary's and matron's offices. In the adjoining house good quarters are provided for the nursing staff; there are common rooms for sisters and nurses, a study room, and a sewing room, besides pleasant bedrooms. It is believed that the conditions will be very satisfactory.

The record of the hospital is excellent and the extension of its facilities is likely to lead to useful work. During last year 223 children were treated. Dr. Catherine Chisholm, the chairman of the medical committee, has shown how the regular provision of milk from wet nurses may be placed on a satisfactory basis, and there is a good system by which a certain number of beds may be allotted to a medical woman, not on the honorary staff, who desires to gain special experience in infant work. Recently these beds have been used, under the direction of Prof. H. S. Raper, by Dr. E. F. Willock, the medical registrar, for her research on the value of oxygen administration in the treatment of atrophic infants. The hospital is a centre for post-graduate instruction, whilst its usefulness in the scientific education of nurses and welfare workers is already well known. The address is Burnage-lane, Levenshulme, Manchester.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are some of the health statistics of three cities for 1924 :—

Name of city.	Estimated mid-year population (R.G.).	Birth-rate.	Death-rates per 1000 of the population.				Death-rates per 1000 births.		
			All causes.	Tuberculosis.	Cancer.	Resp. diseases with influenza.	Neonatal mortality.	Infant mortality.	Maternity mort. from childbirth.
Birmingham ..	946,980	19·2	11·6	1·10	1·30	2·5	35	83	3·9
Bradford ..	290,200	16·9	14·9	1·05	1·50	3·9	40	92	4·0
Leicester ..	241,800	18·1	12·1	1·43	1·16	2·1	29	79	3·2

Birmingham.

Sir John Robertson says the general health of Birmingham during 1924 may be considered to have been satisfactory, and that the death-rate was a low one, considering the amount of unemployment and the proportion of the people who are wretchedly housed. The death-rate, he says, is only a crude measure of estimating the healthiness of a town and the amount of sickness ought to be considered. During 1924 it was ascertained that in the public health department and in a number of industrial concerns with good working conditions the average amount of sickness among males was 10 days per annum and among females 11. In other words, about 1 employee in every 30 was permanently absent. Influenza and respiratory catarrhs accounted for from one-third to one-half of the sick absence. Sir John Robertson states that the methods of birth control are becoming widely known among young people and lead to promiscuous intercourse without inconvenient results. A knowledge of such methods also incidentally supplies information as to the prevention of venereal disease. He considers that a spread of this movement may be a serious menace to the family life of the country. The eugenic idea of improving the human stock is impossible so long as our present customs exist, and is there any reason to suppose that, granted equal environmental conditions, it would be better to breed from the upper or the lower half of society? During the past 20 years the birth-rate in Birmingham has been materially reduced, and if the rate of reduction continues for another 20 years the birth-rate will be lower than the death-rate. Sir John Robertson states the arguments in favour of large families, and thinks that since birth control is much more likely to be put into operation by the skilled artisan and middle class than by the poorest of the community, it is consequently liable to be dysgenic.

Illustrations are given in the report of a building which has been adapted for light treatment. The new Carnegie Institute has also been so equipped, and in November a light department was opened at Yardley Road Sanatorium for the treatment of various forms of tuberculosis by ultra-violet rays. Mr. W. Brennan De Vine, F.R.C.V.S., reports on tuberculosis and the milk-supply. Of 303 samples of milk from outside farms, 26 were found to be infected with tubercle. As the result of visits to the farms 23 cows affected with tuberculosis were found and slaughtered. It was not possible to trace all the offending cows because in several instances cows had been disposed of between the time of taking the sample and the visit of the veterinary inspector to the farm. Three cows were found in the city cowsheds suffering from tuberculosis of the udder and were slaughtered by arrangement with the owners. At the beginning of 1924 there were 18 herds included in the Birmingham scheme for securing tubercle-free herds. One of these herds dropped out during the year owing to the large number of reactors. Out of 129 head of cattle in this herd 37 failed to pass the test and two were doubtful. During the year ten owners applied to be included in the scheme, but three of them gave the matter up. The cows in these three herds numbered 36, 38, and 24, and the number of reactors were 23, 25, and 13 respectively. At the end of the year there were 24 herds left in the scheme, which was an increase of six over the previous year. There were 431 cows tested for the first time, and of these 223, or 51·7 per cent., failed to pass the test. The herds included in the scheme are classified according as to whether they are maintained by breeding, by purchase, or by both methods. In the case of the one non-breeding herd 19 cows were tested and eight failed to pass the test. In the case of the four herds maintained by both breeding and purchase there were 20 failures in 115 tests, 37 in 132, 19 in 53, and 2 in 21 respectively. There were 12 herds maintained by breeding; of these, 8, including 283 head of cattle, furnished 22 reactors, while 4, with 55 head of cattle, had no reactors. An investigation was carried out during the year of the methods employed by various dairymen for the washing of milk bottles. The results indicated that steaming was the only satisfactory process, and that methods of washing by hand with or without the use of some simple machinery are not satisfactory.

Dr. Ethel Cassie submits the first annual report of the Carnegie Institute, which replaces the Farm-street Centre, and has already more than justified itself. There were 145 dental clinics held, with 1883 attendances of mothers and 683 of children under 5 years of age. Anæsthetics were used 1088 times. In addition to other advantages there is an observation ward, and Dr. Cassie considers that it would be difficult to exaggerate the value of such a ward in connexion with a large child welfare centre. Encephalitis lethargica showed a greatly increased prevalence in Birmingham during 1924. There were 282 cases notified with 44 deaths. A description of the types most prevalent in Birmingham was prepared by Dr. Stanley Barnes and circulated to all the medical practitioners in the city. During May, 1925, an inquiry into the condition of the 229 survivors of acute attacks during 1924 showed that only 46 had at that time made a complete recovery.

Bradford.

Dr. John J. Buchan's report on smoke inspection shows that there were 15 prosecutions and that the total penalties and costs only amounted to £13 11*s*. He expresses his regret at such nominal fines which may well place the offending party in a better position than the manufacturers who try to do their duty. Mr. W. Halstead, the veterinary inspector, reports that the average number of dairy cows in the city is 3406, housed in 276 dairy farms. They produce about 7500 gallons of milk in the day, whilst about 7000 gallons come into the city by rail or road. Among the city cows 18 cases of tuberculosis of the udder and 8 cases of advanced tuberculosis were found. Of these 26 cows 14 were slaughtered, while 12 were removed from the city and lost sight of. No "designated" milk is produced within the city. At the municipal milk depôt over 51,000 gallons of milk were obtained from six sources outside the city, including 8760 gallons of Grade A tuberculin-tested milk. During the year 90 samples of shell-fish (65 of mussels, 20 of cockles, and 5 of oysters) were submitted to the bacteriologist; 86 of the samples were obtained at the wholesale market within a very short time of delivery by the railway companies. Of these 13 were reported to be good, 53 were reported to be bad, and 20 to be doubtful. The tuberculosis officer, Dr. H. Vallow, reports as to the unsatisfactory results which, up to now, have been obtained in the training of tuberculous ex-Service men under the 1922 scheme.

Of 35 men referred by the Ministry of Pensions to the tuberculosis officer, 16 were considered suitable for training. Of the 11 who accepted it, 8 completed their course, and the final result was that only one continued in the occupation in which he was trained. Though the results as regards work were poor, Dr. Vallow points out that the long treatment and training has had a lasting effect on the health of these men. The experience gained has also been useful, and an extensive survey of the various methods of providing employment for the tuberculous is being made. The number of new houses (694) was larger than in any year since the war; 375 of them were municipal. In addition to those completed there were at the close of the year 639 municipal houses in course of erection, and 484 houses, mostly of a superior type, being built by private enterprise. In spite of this, many very serious cases of overcrowding came to the knowledge of the department during the year, and at the close of the year applicants for new houses numbered 5493, of whom 4012 were ex-Service men, 2775 of them living in lodgings.

Leicester.

Dr. C. Killick Millard says the most unsatisfactory feature of the year's record was the serious epidemic of diphtheria which began in the third quarter and continued for several months. There were 429 cases reported with 34 deaths. The "Schick" test has not hitherto been used at the isolation hospital, and seven of the staff contracted the disease, one of the cases ending fatally. As a result the staff were inoculated before going on duty in the diphtheria wards. Subsequently two nurses and the medical superintendent had mild attacks of the disease, probably because sufficient time had not elapsed to establish their immunity. Small-pox, after being absent for 19 years (with the exception of one case in 1913), again visited the city in 1924. There were two importations resulting in five cases, all very mild. During 1925 the disease has again been introduced and, though this last outbreak has been more serious, there have been no fatalities as yet. The principal difficulty has been the prevailing mild type of the disease and the absence of many of the classical symptoms. With a view to meeting this difficulty the medical practitioners of the city have been invited to attend demonstrations at the small-pox hospital. Dr. Millard points out that the essential difference between the practice in Leicester and elsewhere seems to be that, when a case of small-pox occurs in Leicester, no effort is made to secure the vaccination and revaccination of the general population, but the use of vaccination is confined to contacts. Forty years ago, in 1885, the Leicester Board of Guardians by an overwhelming vote decided not to prosecute for default under the Vaccination Acts, and since then these Acts in Leicester have been virtually a "dead letter." Thus, during the 17 years 1908 to 1924 the percentage of infants vaccinated has been 6·7. There were 22 cases of encephalitis lethargica notified with seven deaths, as against an average of nine cases and five deaths for the four previous years. The Leicester health committee has formed a local cancer committee, which is carrying out statistical investigations and has issued a leaflet of advice to women on the subject of cancer of the breast. Under the heading "goitre" it is pointed out that two or three firms have now placed an iodised table salt on the market. Dr. Millard gives some particulars indicating a hopeful view of the "Spahlinger" treatment of tuberculosis. As regards housing, Dr. Millard states that a "very substantial measure of relief is in sight in the near future." The procedure as regards the cleansing of dirty houses is discussed, and he inclines to the view that it is better for the tenants to do their own cleaning, including whitewashing of ceilings and the treatment of the walls. In Leicester tenants expect their walls to be papered by the landlords. The recent Birmingham case is quoted in which a notice was issued by the city corporation requiring certain repairs including painting and papering, and the Ministry of Health decided that where the plastering was sound and the surface smooth the requirements that an owner shall re-paper the walls shall be satisfied if the walls are stripped, cleansed, and distempered, and that where the ceilings are not to be scraped one coat of whitewash shall be sufficient.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED OCT. 10TH, 1925.

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 34; scarlet fever, 2287; diphtheria, 1118; enteric fever, 68; pneumonia, 842; puerperal fever, 54; cerebro-spinal fever, 7; acute poliomyelitis, 12; acute polio-encephalitis, 3; encephalitis lethargica, 36; dysentery, 7; ophthalmia neonatorum, 120. There were no cases of cholera, plague, or typhus notified during the week.

Deaths.—In the aggregate of great towns, including London, there were 4 deaths from enteric fever, 14 from measles, 8 from scarlet fever, 20 from whooping-cough, 28 from diphtheria, and 57 from influenza, as compared with 51, 41, 26, and 11 in the preceding weeks. In London itself there were 7 deaths from diphtheria, 2 from whooping-cough, and 12 from influenza, as compared with 9, 5, 7, and 1 in the preceding weeks.

Obituary.

CHARLES FREDERICK SONNTAG, M.D., CH.B. EDIN.

Dr. C. F. Sonntag, whose death occurred at Hampstead on Oct. 10th, was born at Glasgow 38 years ago, and was educated at Edinburgh and at the Middlesex Hospital. He graduated as M.B. in 1910 and as M.D. (with honours) in 1913, and held obstetrical and surgical appointments in Scotland. Soon after the outbreak of war he joined the Royal Army Medical Corps and saw active service as regimental medical officer in several units of the Salonika Expeditionary Force. In 1916, being incapacitated by tuberculosis from further foreign service, he was invalided home and became medical officer to the Red Cross Clinic for Disabled Officers in Great Portland-street. Here he threw himself with energy into the investigation and application of the new methods of physical treatment which had been brought together, and proved his ability by his researches. He produced papers dealing with the influence of temperature on muscular work, with ergometers, and with thermal debility. Thence he was recommended as hydrologist to the Military Orthopædic Hospital at Shepherd's Bush, where he pursued his studies on stimulant and sedative baths, and though in 1919 he accepted the post of prosector and anatomist to the Zoological Society of London and took up research on comparative anatomy, he continued as a hydrologist in consultant practice.

In 1922 Dr. Sonntag was appointed demonstrator in anatomy at University College. During the six years he worked at the Zoological Gardens he published in the Proceedings of the Society no less than 30 papers on comparative anatomy, all of which bore witness to the thorough and painstaking way in which he carried out his work. His publications included a series of papers on the comparative anatomy of the tongues of the mammalia, and were mainly descriptive in form. His later papers dealt with the anatomy and physiology of the anthropoid apes, and in 1924 he summarised his findings in a treatise on the morphology and evolution of the apes and man, which will be the standard work on the subject for many years to come.

Dr. Sonntag's early death has removed a man whose critical enthusiasm has left its mark on both the subjects in which he interested himself.

RUPERT CECIL CHICKEN, F.R.C.S. ENG., L.R.C.P. LOND.

Mr. R. C. Chicken, consulting surgeon to the Nottingham General Hospital, died on Oct. 3rd at the age of 75. After studying at Guy's Hospital, he held the appointments of house surgeon and obstetric assistant there, and became registrar at the Evelina Hospital. He became F.R.C.S. in 1875, and was appointed prosector of anatomy at the Royal College of Surgeons. Later he returned to Nottingham and was unexpectedly left in charge of a large mixed general practice. His training and natural aptitude fitted him for surgery, and in spite of other work he was able to maintain his operative skill; in 1891 he was elected to the staff of the Nottingham Hospital, and in 1892 was president of the Nottingham Medico-Chirurgical Society. Mr. Chicken was the author of a long series of surgical papers, and was in addition a man of wide reading and culture, with an active interest in archæology. He retired from the executive staff of the hospital in 1907, but during the war served as surgeon to the Whipps Cross War Hospital, Leytonstone. He leaves a widow, one son, and two daughters.

HAROLD MAXWELL LEFROY, M.A. CAMB., F.E.S., F.Z.S.

THE science of entomology has sustained a severe loss by the untimely death at the early age of 48 of Prof. Harold Maxwell Lefroy, professor of entomology at the Imperial College of Science and Technology. Prof. Lefroy died as the result of an accidental exposure to poisonous gas in the course of experiments designed to discover a suitable method of dealing with flies and their maggots. He lay unconscious for three days and in spite of all possible medical assistance succumbed in the evening of Wednesday, Oct. 14th.

Harold Maxwell Lefroy was educated at Marlborough and King's College, Cambridge. He took the Natural Sciences Tripos, choosing zoology for one of his subjects. At that time the zoology taught in Cambridge was rather of the laboratory and formal type, and it is on record that Lefroy's attention to this aspect of the subject was but half-hearted. The passionate love of insects and their ways seems to have been born in him, and he deserted the laboratory demonstrations in order to practise "bug-hunting" in all the country surrounding Cambridge. After taking his degree, as at that time entomological posts were almost non-existent, he was forced to adopt the profession of teaching natural science in a school. But the memory of his devotion to insects was preserved by his teachers in Cambridge, and when the demand came for a man to go to the West Indies and deal with the pests which were destroying the sugar-canes there, it was Lefroy whom they recommended for the post.

After a successful career in the West Indies Lefroy was appointed as the first Imperial entomologist to the Government of India, and it was during a period of leave in England in 1910 that he was induced by the authorities of the Imperial College of Science to deliver a course of lectures on entomology. The success of this course made the governors of the College resolved, if possible, to secure him permanently, and the next year he became professor of entomology, a post which he retained until his death.

During the war his services, like those of all the rest of the College staff, were placed at the disposal of the Government, and he went to India in 1915 to investigate the silk industry, and in 1917 to Australia to deal with the pests which were destroying grain. His success in grappling with these and other pests is told in a leading article on another page. His immediate relation to medical questions was slight, but during the war, when house-flies and blue-bottles were recognised as disseminators of disease, he devoted considerable time to devising fly-traps of various kinds and measures for dealing with the maggots. It was, indeed, as we have already mentioned, during the course of experiments with gases as a means of destroying flies that he met his death. He leaves a gap in the staff of the Imperial College and in the entomological world which will not be easily filled.

EDMUND ARCHIBALD ARMSTRONG, M.A.

WE record with deep regret the untimely death of Mr. Archibald Armstrong which occurred on Oct. 15th at Oxford and Cambridge Mansions in his sixty-seventh year. He had been a valued member of our staff for nearly 30 years.

Archibald Armstrong was the son of the Rev. John Armstrong, rector of Dinder and prebendary of Wells. He was educated at Haileybury, where he was captain of the school, and Jesus College, Cambridge, where he was a Rustat scholar, and at both places he distinguished himself also on the running-track. He graduated with classical honours and was called to the Bar, but turned aside almost at once to literature. He wrote stories and verses for many of the popular magazines, one series contributed mainly to the *St. James's Gazette* appearing in volume form under the title of "Tales from the Temple." This was followed by a novel with a particularly ingenious plot, "Under the Circumstances," while a play supplied to the German Reeds proved a modest success in the old Queen's Hall. He became editor shortly after of the illustrated weekly paper, *Black and White*, but his control of the paper was only partial, and he found the position untenable. During this period he wrote intermittently for various London and provincial papers, and regularly for THE LANCET on the legal side of medical affairs, work which he was discharging until his death. We have many reasons for knowing that his well-informed and even pronouncements upon many difficult professional problems were of great value to our readers, while the public derived indirect advantage from much of his work. In this connexion there may be instanced a ruthless exposé of the proceedings of a dangerous group of quacks, who were defrauding women, as well as inciting them to misbehaviour or crime, by the sale of abortefacients.

In the course of general journalism he grew to be a considerable expert in certain artistic fields, with the result that he became one of the managers of the Fine Art Society's gallery in Bond-street, under the late Marcus Huish. Here he was working when the war broke out, when he entered the Censorship Department, where his duties were prolonged some time after the armistice in view of the preservation and arrangement of the records. When this work came to an end he returned to his duties at THE LANCET, and also joined the staff of the *Daily Express*, to which paper he was attached at his death, while he resumed his connexion with the Fine Art Society by joining the directorate.

He had not been physically strong for some years and probably worked beyond his powers, but quite recently his health appeared to have much improved, and the announcement of his death will come as a shock to many friends and journalistic colleagues. For he was held in high esteem for his exact knowledge, his careful and accurate methods, his fairness, and unfailing courtesy. We owe him a great debt at THE LANCET.

He married early in life the daughter of the late Rev. Lancelot Errington, rector of Midgham, Berkshire, by whom he had one daughter. To these we offer our sincere sympathy.

ST. MARY'S HOSPITAL FOR WOMEN AND CHILDREN.—Sir Alfred Fripp describes this hospital at Plaistow as a model as far as the in-patients' department is concerned, but in a backward state in regard to accommodation for out-patients. An endeavour is being made to improve this state of things by the preparation of a scheme which will cost £25,000 eventually, though the first portion of the work is expected to cost no more than £8000.

Correspondence.

"Audi alteram partem."

THE SANATORIUM AND AFTER.

To the Editor of THE LANCET.

SIR,—All who are interested in the solution of the tuberculosis problem will agree with your statement that "the after-treatment of ex-sanatorium patients is one of the most urgent and elusive problems which medical and social science has to face."

Many of those who have been considering for some years this aspect of the question will welcome the admission that "from the strictly medical standpoint . . . . the combination of sanatorium, settlement, training centre, and workshop offers the ideal conditions for after-care." This is the ideal for the general acceptance of which Dr. Varrier-Jones, without much outside support, has, at Papworth, been striving for years, and it will doubtless be a source of much satisfaction to him to find that the success of the pioneer work which he had carried out there has at length received public recognition. On a recent occasion Mr. Neville Chamberlain expressed his complete approval of the settlement plan and stated that henceforth it would receive the full support of the Ministry of Health.

The observation that "settlements can only deal with a fraction of the tuberculous population" should possibly have been slightly modified and to be strictly accurate should read, "are at present only dealing with," but at Papworth alone the fraction is even now ten times larger than is being dealt with under any other combined scheme with which I am acquainted, and when Preston Park, near Maidstone, which has recently been taken over by the British Legion and which at their request is now being reorganised by Dr. Varrier-Jones on Papworth lines, is reopened the fraction will be still larger. Private individuals are, of course, free to support such charitable efforts as appeal most closely to their sympathy, but with regard to public money and quasi public funds the case is different, efficiency and the welfare of the community as a whole are then the guiding principles of action.

Having had somewhat exceptional opportunities of judging of the relative value of the methods mentioned in your annotation I have come to the unhesitating conclusion that the development of settlements on Papworth lines around those of the existing sanatoria which admit of such an evolution holds out the most hopeful prospect of a continuous advance towards the solution of the problem of the after-care of the tuberculous worker, and to that end I propose to devote such energy and influence as I possess.—I am, Sir, yours faithfully,

JAMES K. FOWLER.

Clarges-street, Mayfair, Oct. 19th, 1925.

LUMINAL, BORAX, OR BROMIDE IN EPILEPSY.

To the Editor of THE LANCET.

SIR,—Concerning the relative value of luminal, bromide, and borate in epilepsy, I was interested to read of the very satisfactory results obtained by Dr. Figdor with combinations of bromide and borax. For many years my initial treatment—apart from any general treatment or psychotherapeutic measures necessary—has been to prescribe a combination of sodium bromide and sodium biborate, and it is seldom indeed that some degree of improvement is not obtained, at least in decreased frequency and severity of the seizures and in the patient's symptoms.

A start is made with 15 gr. sodium bromide and 7 gr. sodium biborate, together with 3 minims liquor arsenicalis, given morning and evening, and increasing to three times daily if improvement is not obtained. The addition of a few minims of liquor arsenicalis is useful in preventing a bromide rash. The prescription is really an old one and well established; its value would appear to lie chiefly in the bromide rather than in the borax, although the latter may assist. With borax alone, even in large doses, in epilepsy, I have never met with any success. If a good result is not obtained with the combination of sodium bromide and biborate, my experience has been that it is useless to persevere with bromides and that one must seek for another remedy.

In a contribution to the discussion on the Nature and Treatment of Epilepsy [1] at the B.M.A. meeting, Bradford, July, 1924, I gave the results of treatment with different remedies in a large number of cases of idopathic epilepsy, analysed in conjunction with Dr. H. C. Beccle. We found that several cases responded to luminal in a most remarkable manner. I am, however, in entire agreement with Dr. Williams-Walker that more than 3 gr. luminal per day is undesirable, and I stated in the above communication that my experience had been that if one did not obtain a satisfactory result with 1½ gr. luminal morning and evening the case was unlikely to respond to luminal at all. If a dose of 3 gr. per day be not exceeded, none of the unpleasant symptoms mentioned by Dr. Figdor and Dr. Carlill will be seen. In general, I have not found that luminal loses its effect after a few months, and have some cases that have been continuing on 3 gr. a day over a period of more than two years without experiencing an attack. In patients who do not show an adequate response to either the bromideborate or luminal, a combination of sodium bromide (10 to 15 gr.) and luminal (1½ gr.) night and morning will often produce a good result. In three cases so treated attacks had been entirely absent for over a year. Of other remedies, some cases—especially those in which the fits are nocturnal—respond to dialacetin (1½ gr. either at night or twice daily) when other drugs have failed.

I am, Sir, yours faithfully,

C. WORSTER-DROUGHT, M.D.

Cavendish-square, W., Oct. 19th, 1925.

UNUNITED FRACTURES.

To the Editor of THE LANCET.

SIR,—With some statements in Prof. E. W. Hey Groves's interesting address on this subject, published in THE LANCET of Oct. 10th, it is impossible for me to agree. Prof. Groves states that "unrestricted mobility" is one of the mechanical causes. This recalls vividly to my mind the case of a man with an unreduced dislocation of the humeral head. It was of several weeks' duration. In the attempt to reduce it the surgical neck of the humerus was fractured. As house surgeon my instructions were to apply no splints and to carry out passive movement at the site of fracture frequently and fully so as to establish a false joint. The proceedings were naturally very painful, and the result was absolute and strong union. This impressed me much, for at that time the teaching in fracture of the humerus was to immobilise the whole upper extremity, with even a shoulder-cap and a splint carried to the end of the fingers, lest non-union should result. This case was an example of the most unrestricted mobility that I have ever heard of.

The next statement made with which I do not agree is that "in the case of the shaft of the humerus the difficulty of efficient fixation is the prime cause of frequent non-union." Much depends on what is meant by "efficient fixation." In any arm it is impossible to apply splints that will in any way absolutely control the fragments from movement. That is the case in all fractures. How much more so when the arm is swollen with the effused blood. There is only one way to produce immobility and that is open operation. There is no need, however, for any

[1] Brit. Med. Jour., 1924, ii., 1054.

operation, nor do patients want an operation if they will get equally good results without and no likelihood of non-union. Personally I am unaware of a case of non-union of the humerus where the principle of active movement has been adopted from the first. There has been only one case of delayed union to my knowledge, and that took six months to solidify. It was treated by making the patient tap her elbow frequently on a firm cushion, with the humerus straight up and down, and otherwise using it as much as she could. Such is the record for simple fractures, and in septic fractures I have not had a case either, though many came under my care with gaps and foreign bodies during the three years I was in charge of wards at the Edinburgh War Hospital, Bangour.

The last statement with which I do not agree is that "The importance of mobility as a cause of non-union has been obscured by the teaching of those who advocate early movement of a limb as conducing to rapid restoration of function." If Prof. Groves had seen and followed the wonderful results obtainable by early active movement he would probably have been much less drastic in his remarks. It is close on 25 years since I adopted the method of treating fractures of the upper extremity by early active movement *short* of pain and gradually increasing the movement. No splints are employed unless some obvious gain will result. Naturally the upper extremity lends itself to this type of treatment. The lower extremity is different as it is weight-bearing in character. So profoundly have the excellent results impressed me that I consider this method of treatment a "principle" which should be taught widely. There has been only one case of non-union in my experience, and that was in a simple fracture of the clavicle. With such a record this method of treatment is certainly worthy of consideration, as not only are the results quicker but are better than by other means.

I am glad to say that my old house surgeons and many of my old pupils are at present engaged in carrying out the treatment of fractures on this principle, and so far I have not heard of any of them being disappointed.

I am, Sir, yours faithfully,

Edinburgh, Oct. 13th, 1925. J. W. DOWDEN.

PROPOSED MEMORIAL TO THE LATE MR. HAMILTON DRUMMOND.

To the Editor of THE LANCET.

SIR,—The tragic death of Mr. Hamilton Drummond is so fresh in the minds of the medical profession that it is unnecessary to detail the circumstances of that calamity. He was so well known and so greatly beloved by those in all walks of life that it is felt that some memorial should be promoted. A committee of his colleagues on the staff of the Royal Infirmary, together with some non-medical friends, has been formed for the purpose of carrying out this object. It is proposed that the memorial should be connected with the Newcastle-upon-Tyne Infirmary and the Medical School which he served so faithfully, and in which he was so much interested. The exact form of the memorial must be decided at a later date, and will largely depend upon the amount subscribed. The committee has decided to appeal for subscriptions up to a limit of 5 guineas, but it is hoped that all who cherish his memory will subscribe irrespective of the amount.

The following is a preliminary list of subscribers for amounts totalling £395 14*s.* already received or promised:—

Mr. H. B. Angus, Dr. Arnison, Dr. Armstrong Atkinson, Mr. J. Anderson, Mr. Arkle, Dr. Allison, Dr. Adams.
Mrs. J. L. Boyd, Dr. R. A. Bolam, Dr. V. E. Badcock, Mr. A. H. Burgess, Dr. Beattie, Dr. A. Brumell, Mr. Barclay, Dr. Bishop, Mr. S. Barling, Dr. Edgar Babst.
W. T. Cochrane, Mrs. W. T. Cochrane, Mr. J. Clay, Mr. Arthur Cooke, Colonel Cookson, Dr. J. Charles, Dr. Mabel Campbell.
C. Davey, Mr. Dickie, Dr. W. Davidson.
Mr. H. Evers.
Mr. Ernest Finch.
Dr. Gamlen, H. A. Graves, Sir C. Gordon-Watson, Dr. M. Glasse, Mr. Gilmour.
Dr. W. E. Hume, Dr. Hall, Dr. Hunter, Dr. Hindmarch, Mr. Hodgson.
Mr. Irwin.
Mr. A. M. Johnston.
Miss Kirkhouse.
Sir Alexander Leith, Bart., Mr. J. W. Leech, Dr. R. P. R. Lyle, Dr. Lloyd.
E. Matheson, Mr. A. M. Martin, Dr. Muirhead, Mr. John Morley, Mr. K. W. Monsarratt, Dr. R. E. Moyes, Dr. F. Murray, Dr. S. McDonald, Dr. Mona McNaughton.
Sir George Noble, Bart., Mr. Philip Noble, G. P. Noble, H. W. Noble, P. E. Noble, Dr. Nattrass.
Dr. Ogden, Sir Thomas Oliver.
Mr. F. C. Pybus, Dr. Parkin, Dr. Patterson.
Dr. Ruxton.
T. N. Sample, Mrs. T. N. Sample, Dr. James Smith, Mr. Graham Simpson, Dr. Spence, Dr. Slade, Dr. Wilkie Smith, Dr. A. Smith, Dr. E. D. Smith, Mr. Herbert B. Speke.
J. E. Taylor, Mr. G. Grey Turner, Dr. Thompson.
H. A. Westmacott, Mrs. Westmacott, Mr. Wilson, Mr. R. J. Willan, Mr. J. D. Wardale, Mr. S. S. Whillis, Dr. Weidner, Mr. G. E. Wilkinson, Dr. F. S. Walker, Mr. A. Whitelocke, Mr. Wardill, Dr. Hedley Whyte, Dr. Welsh.

Prof. R. P. Ranken Lyle and Mr. Philip E. Noble have been appointed joint treasurers. Subscriptions may be sent to the former at 11, Osborne-terrace, or to Messrs. Lloyds Bank, Ltd., Grey-street, both in Newcastle-upon-Tyne, or to any of the following: Prof. H. B. Angus, Prof. Thomas Beattie, Sir Alexander Leith, Bart., Mr. A. M. Martin, Mr. Philip E. Noble, Sir Thomas Oliver, Mr. Herbert B. Speke.

I am, Sir, yours faithfully,

G. GREY TURNER,
Oct. 16th, 1925. Convenor of Committee.

THE DANGER OF SELF INSULIN INJECTION.

To the Editor of THE LANCET.

SIR,—All patients are not as apt as Prof. Pirquet's (THE LANCET, Oct. 10th, p. 765). A recent case under the care of Dr. H. Batty Shaw illustrates the risk to patients of self-injection of insulin.

A. B., aged 22, had been receiving 75 units of insulin per diem for eight months. The injections were made by the patient himself at home, some into his upper arm, but most into the upper part of both thighs. According to the patient, a small lump formed at the site of injection, which in some cases discharged, leaving an ulcer. He was admitted to University College Hospital in a semi-comatose condition, with air-hunger, and the urine was found to reduce Fehling's solution. A diagnosis of diabetic coma was made, repeated injections of insulin were given (100 units in all), and rapid recovery ensued. The statement made by the patient showed that the injections were not properly performed; some of the fluid escaped from the needle and was not introduced into the tissues. There were 15 ulcers, 12 on the right leg and 3 on the left, the largest being 4/5 × 2/5 in. The ulcers reached a certain size and then spread no further. The bases consisted of smooth granulation tissue, pink in colour; the edges were slightly raised, but the ulcers were shallow. Round some of the ulcers there was considerable thickening, which involved the tissues beneath the skin. In certain parts of the thigh thickened subcutaneous tissue could be palpated, and these had not ulcerated. Over these thickenings some slight reddish discoloration of the skin was observed. There seemed to be no attempt on the part of the skin to grow over the ulcerating areas. The technique of the injection as performed by the patient was as follows: The needle was placed in boiling water and the site of the injection was cleaned with methylated spirit.

No doubt similar cases have occurred and others will continue to occur as the use of insulin becomes more widespread. Some better arrangement is needed to avoid the development in these cases of diabetic coma directly due to faulty technique.

I am, Sir, yours faithfully,

A. C. M. ELMAN, M.B., B.S. Lond.,
Late House Physician, University College Hospital,
Oct. 15th, 1925. London, W.

Dr. Henry Alfred Alford Nicholls, C.G.M., has been appointed an Unofficial Member of the Executive Council of the Presidency of Dominica.

Medical News.

UNIVERSITY OF OXFORD.—Dr. Richard Stephen Creed, of Trinity, has been elected to a Fellowship in Physiology at New College. Dr. Creed held a Millard Scholarship at Trinity, was subsequently elected to a Senior Demyship of Magdalen College, and has since had various appointments at St. Thomas's Hospital.

UNIVERSITY OF GLASGOW.—The following medical degrees were conferred on Oct. 19th by the Vice-Chancellor, Sir Donald MacAlister:—

M.D.—Grenville W. St. Clair Ramsay (with high commendation) and Alexander M. Macqueen.

M.B., Ch.B.—With honours: Janet S. F. Niven and John V. Thomson. With commendation: Gavin S. Anderson, Elias Bloch, Alexander Dale, Josiah R. Bailey, and Catherine A. Brown. Ordinary degree: William J. Aitken, James W. M. Alexander, William Allison, John Anderson, John G. Anderson, David E. Aspin, William J. C. Auld, William J. Barbour, Arthur D. Briggs, James C. Brown, Douglas N. Buchanan, James H. Burnside, Alexander M. Campbell, Jeanie G. Campbell, John Campbell, John B. Carrigan, John F. Christie, William A. S. Couper, Francis A. Coutts, Alexander W. Cuthbert, John G. Daigleish, Thomas H. Dalrymple, Jack V. M. Davies, Jean M. Dixon, Matthew K. Dunlop, Maurice Freeman, Mary A. Frew, Sydney M. Galbraith, Annie Gartly, Elena Gill, Douglas W. Gillies, Gordon Gillies, Agnes M. Hamilton, Everard Henderson, Nettie S. Hendry, William Hope, William Hosie, Jeanie M. Howitt, David G. Hunter, Elizabeth F. Hunter, William Hutchison, James Jarvie, David Johnston, Julia P. Johnston, Robert Johnstone, Annie C. Kerr, Charles S. Kerr, James G. Kidd, Isobel C. King, Peter S. Kinloch, Andrew P. Laird, Elizabeth H. Livingston, Mary C. Livingstone, John L. Macaulay, Robert P. J. McBroom, John A. McCluskie, William J. McCulley, James MacDonald, James S. Macdonald, Archibald MacEwan, John F. Macfarlane, David G. D. McGregor, George T. MacGregor, Jean N. McGregor, William McIlvenna, James McIntyre, Archibald A. MacKelvie, Helena M. McKnight, Murdo H. Maclaine, Agnes F. H. McLean, William MacLean, Donald Macleod, Susan M. MacMurray, Mona H. Macnie, John S. McTavish, William Mercer, William Murray, Arthur F. Nimmo, John Parker, Margaret F. Paton, William D. Peock, Pauline Podlashuk, Elizabeth M. Rattray, Joseph Ribchester, Christopher G. Rippin, Ruth M. L. Ross, Alfred G. Shanks, Helena M. Shanks, Thomas M. Sharp, Robert K. Shearer, Jean W. Smellie, Vida J. M. Stark, Hugh Stewart, Edith K. Stocker, Frederic Syson, David Thomas, Jean G. Thomson, Hugh A. Walker, Maggie B. Walker, James B. Watson, Henrietta C. Weir, Evelyn A. Weyman, Dorothy F. M. Whiteford, Elizabeth C. Whyte, Alexander F. Wood, Thomas Young, and Tchi-waang Yun.

Janet S. F. Niven gains the Brunton Memorial Prize awarded to the most distinguished graduate in medicine of the year, and Morton A. Foulis gains the West of Scotland R.A.M.C. Memorial Prize awarded to the candidate with the highest aggregate marks in medicine, surgery, and midwifery in the Final Examinations for the degrees of M.B. and Ch.B. held during the year 1925.

UNIVERSITY OF DUBLIN, SCHOOL OF PHYSIC, TRINITY COLLEGE.—At examinations held recently the following candidates were successful:—

FINAL MEDICAL EXAMINATION.

Part I.—Solomon Behr (passed on high marks), Wilfreda D. C. T. Pigott, Wilfred F. Lane, Richard M. Moore and Gilbert M. Smith (equal), Paul M. Garry, Thomas F. M. Woods, Lenox R. S. MacFarlane, Charles L. Day, Nathaniel Burstein, David M. Carson, George M'Donald, Andrew C. C. Charles, and Joseph A. K. FitzGerald.

In completion.—Kathleen R. Byrne, Evelyn E. Connolly, and Desmond Blewitt.

DIPLOMA IN GYNÆCOLOGY AND OBSTETRICS.

Joseph Rego and Amy B. R. A. Perriton.

THE L.C.C. AND IMMUNISATION AGAINST DIPHTHERIA.—In March, 1924, the Public Health and Education Committees of the London County Council were directed to "consider and report whether or not the treatment carried out by the department of health in New York City for rendering children immune from diphtheria should be adopted in the London schools." In their consideration of the subject, the two Committees have had before them a report by the medical officer of the Council, presenting a review of the work which has been carried out in connexion with active immunisation for the control of diphtheria both at home and abroad, and it is understood that the Ministry of Health are conducting inquiries with regard to immunisation of the staffs of fever hospitals, and in connexion with maternity and child welfare work. The L.C.C. Committees have been advised that these lines of investigation should be thoroughly explored before further consideration is given to the question of immunisation of children of school age. The Committees have, therefore, reported to the Council that, in their opinion, it is not advisable at the present time that toxin-antitoxin treatment in connexion with the prevention of diphtheria should be adopted as part of the Council's scheme of medical treatment of school-children.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.—The annual dinner of this Society was held on Oct. 16th at the Piccadilly Hotel, Dr. George F. Buchan, President of the Society, being in the chair. A large number of medical officers of health, several of whom had passed the chair, were present, while the guests included Sir Alfred Mond, M.P., Minister of Health in one of Mr. Lloyd George's Cabinets; Sir H. Kingsley Wood, M.P., Parliamentary Secretary to the Ministry of Health; Sir Walter Fletcher, Secretary of the Medical Research Council; Sir StClair Thomson, President of the Royal Society of Medicine; Sir Arthur Chapman, Chairman of the County Councils Association; Sir George Newman, Chief Medical Officer to the Ministry of Health; Sir William Leishman, Director-General, A.M.S.; Sir Bruce Bruce-Porter; Colonel F. E. Fremantle, M.P.; Dr. Alfred Cox, Medical Secretary of the British Medical Association; and Sir Squire Sprigge, Editor of THE LANCET.

The principal toast, that of "Prosperity to the Society," was proposed by Sir Kingsley Wood, who acknowledged warmly for his department the loyal coöperation of the medical officers of health during the past year. He said that he refused to give way to the new disease of "pessimitis" in respect of health progress, and reminded his hearers, giving dramatic figures for comparison, of the decline which had taken place in the national death-rate of recent years, and the great improvements in the expectation of life and in the infantile mortality-rate, amounting to a revolution in medicine. A similar story of progress could, he said, be told in connexion with the incidence of enteric fever and of tuberculosis. He concluded by alluding to the necessity of a closer linking up of the various health authorities of the country.

Dr. Buchan replied for the Society in a studiously quiet manner with a gratifying story of good work done. He pointed to the progress of public health along most lines of its numerous departments, and made the valuable suggestion that no medical man should proceed to his final degree or diploma until he had ascertained something of the pattern of public health administration at any rate in his own area. But he urged that if workers in public health were to obtain good results local authorities must take a closer interest than at present in the research work necessary to modern preventive medicine, while he enumerated the future objectives of public health endeavour in a succinct series of headings.

The toast of the Guests was proposed by Dr. W. J. Howarth in very generous mood, and was responded to by Sir Alfred Mond in a humorous reply. Protesting against the introduction of a new disease by the Parliamentary Secretary to the Ministry of Health, he said that the duties of the medical officer of health were sufficiently heavy already, comprising, as he conceived them, the equipment of an architect and builder, a land surveyor, an engineer, a medical practitioner, and a chemist, while he himself had had something to do with the new responsibilities in respect of milk. How efficiently those multifarious duties were at present discharged he considered proved by the fact that our national pattern of public health administration had been copied by all advancing civilisations, while no nation as yet had attained to the high level of the pattern. He closed by a reference to the establishment, through the generosity of the Rockefeller Foundation, of a new College of Hygiene in London. Sir Arthur Chapman and Sir StClair Thomson also replied, the latter speaking for the Royal Society of Medicine: "One of the revolutionary bodies passionately admired by Sir Kingsley Wood, a Conservative Minister, although their house at 1, Wimpole-street had not yet been raided. But the medical revolution raised by medical men did not, as one poet sat it, bring red ruin and the breaking up of laws, but as another poet put it, it moved towards drinking in larger life from fuller air." Sir Kingsley Wood, he added, had so eloquently pointed out the gain to the country in health and wealth brought about by the activities of the M.O.H.'s that no doubt a grateful country and a generous Government would recognise the situation by steady increases of salary. Due acknowledgment was made of the services of Mr. G. S. Elliston, executive secretary of the Society and editor of the *Medical Officer*.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—On Monday, Oct. 26th, at 5.30 P.M., Dr. Marcus Paterson will give the second lecture for the Fellowship of Medicine on the Treatment of Pulmonary Tuberculosis at the Medical Society of London, 11, Chandos-street W. All members of the medical profession are welcome. During the month of November the London Lock Hospital will hold a comprehensive course in venereal disease. At the Chelsea Hospital for Women there will be a three weeks' course in Gynæcology from Nov. 2nd to the 21st. From Nov. 3rd to the 28th Dr. Porter Phillips and Dr.

Thomas Beaton will give twice weekly lecture-demonstrations on Psychological Medicine at the Bethlem Royal Hospital. There will be a course in Diseases of the Chest, Heart, and Lungs at the Victoria Park Hospital from Nov. 9th to the 21st. The Royal Waterloo Hospital will give a course in Medicine, Surgery, and Gynæcology from Nov. 23rd to Dec. 12th, embracing all the departments pertaining to diseases of women and children. A late afternoon course (4.30 to 6 o'clock) will be held at the London Temperance Hospital from Nov. 23rd to Dec. 4th for the benefit of the general practitioner. Application for copies of each syllabus and for the general programme should be made to the secretary at 1, Wimpole-street, London, W. 1.

UNIVERSITY OF BRISTOL: ASSOCIATION OF ALUMNI (LONDON BRANCH).—The annual dinner will be held on Friday, Nov. 6th, at 7.30 for 7.45, at Pagani's Restaurant, 42–48, Great Portland-street, London, W. Viscount Haldane will preside and Prof. Lloyd Morgan will be the guest of the evening. Tickets may be obtained from the hon. secretary at Holloway Sanatorium, Virginia Water.

VIENNA: POST-GRADUATE COURSE.—The Vienna Medical Faculty has now prepared the syllabus of its nineteenth post-graduate course on syphilology and dermatology with special reference to treatment, for native and foreign medical practitioners, which will be held from Nov. 23rd to Dec. 6th. Copies of the syllabus and further information may be obtained from the Dean, Prof. Richard Wasicky, Ring des 12 November, Universität, Vienna.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND.—The annual meeting of the College was held on the morrow of St. Luke's Day, when the following officers were elected. President: Dr. T. H. Wilson. Censors: Drs. W. A. Winter, G. FitzGibbon, G. E. Nesbitt, R. J. Rowlette. Treasurer: Dr. H. T. Bewley. Registrar: Dr. T. P. C. Kirkpatrick. Dr. Wilson, the new President, has been a Fellow since 1898, and has been King's Professor of Midwifery in the School of Physic since 1911.

TWO VACANT CHAIRS OF MEDICINE.—Dr. John Mallet Purser has resigned the Chair of the Regius Professor of Physics in Dublin University, to which he was appointed in 1917 after the death of Dr. James Little. Dr. Purser had been King's Professor of the Institutes of Medicine in the School of Physic from 1874 to 1902. He has recently been in ill-health. The vacancy will be filled in December. Dr. Joseph O'Carroll has resigned the Chair of Medicine in University College, Dublin, National University of Ireland, to which he was appointed in 1912 on the death of Sir Christopher Nixon.

WELSH SCHOOL OF MEDICINE.—A special meeting of the Court of the University of Wales was held on Oct. 16th at Llandrindod Wells to consider the following resolution: "The University Court, having considered the present position of the Welsh National School of Medicine in the University, and having taken account of the correspondence between His Majesty's Privy Council, the University Council, and the Council of the University College of South Wales and Monmouthshire in regard to the position of the school, is of the opinion that, with a view to providing for the full development of the School of Medicine as a national centre for medical education and research in Wales, the best interests of the school will be served by constituting it an independent school in the University. The University Court, therefore, hereby resolves, on the recommendation of the University Council, to submit a humble petition to His Majesty in Council for a charter incorporating the school as an independent school of the University of Wales." After full discussion, in which the Principal of Cardiff College, Sir Isambard Owen, and Prof. Joseph Jones, among others, took part, the motion was put and carried by 71 votes to 41. It was agreed to refer the drafting of the scheme to the University Court in consultation with the University Council of Cardiff College.

MANCHESTER AND SALFORD MEDICAL CHARITIES.—At the annual meeting held on Oct. 15th of the Hospital Sunday Fund it was stated that the income for the year, £26,181, represented an increase of £19,000 on the previous year's figures, due principally to the inclusion in the accounts for the first time of the Alexandra Day Fund, amounting to over £3000, and to an increase of nearly £6000 in the ordinary income. Particular praise is due to the students of the University of Manchester, who have increased the yield of their "rag" on Shrove Tuesday to over £6000, being £3000 in excess of the corresponding contribution the previous year. The one disappointment was the fall of £1000 in the amount collected in the churches on Hospital Sunday, probably due to the execrable weather on that day. Amongst the various local medical institutions £23,650 was distributed, being £10,000 more than was distributed last year. In spite of this satisfactory result the committee of management are faced with a serious difficulty owing to the fact that the cost of maintaining patients from the outside districts was considerably more than the amounts contributed by these districts. During the year 40,520 cases were treated from outside districts at a cost of £103,776, while the amount contributed was only £57,665. A contribution of one penny per week by every employed person in the district would realise £50,000 in each year.

MANCHESTER MEDICAL SCHOOL.—The annual dinner of the school will be held in the Grand Hotel, Manchester, on Thursday, Nov. 19th, Mr. C. Roberts in the chair.

NOTTINGHAM MEDICO-CHIRURGICAL SOCIETY.—At the first meeting of the session on Oct. 30th Sir StClair Thomson will give an address on Dysphagia and Some Diseases of the Œsophagus. Mr. H. Bell Tawse will be in the chair.

HOSPITAL OF ST. JOHN AND ST. ELIZABETH.—The Tetley Theatre, the Winifred Bertha de la Chare Isolation Ward, and the X ray department of this hospital, at 40, Grove End-road, London, N.W. will be formally opened on Thursday, Oct. 29th, at 3.30 P.M.

CHESTER MATERNITY HOSPITAL.—The Marchioness of Cambridge recently opened a new maternity hospital provided by a combined effort of the Chester Benevolent Institution, founded in 1789, and the District Nurses' Association, both of which are now amalgamated with the hospital. The first baby born in the institution was presented with a silver cup.

HOSPITAL SAVING ASSOCIATION.—The contributors to this association now number over 180,000. From the beginning, in 1922, about £100,000 has been received, £63,000 of which has been paid to coöperating hospitals. Refunds amounting to £11,356 have been paid to contributors admitted to non-coöperating hospitals, and a further £16,000 has been refunded to contributors in respect of extra hospital benefits.

KING'S COLLEGE HOSPITAL DEBT.—Having failed to repay completely the debt to the bank, the committee of management have decided to sell all their war loan on general account, which has appreciated in value. This will leave a debt of only about £5000 which it is hoped to clear by contributions without the necessity of selling the remaining securities, the value of which has decreased since the hospital became possessed of them.

MEDICO-LEGAL SOCIETY.—A meeting of this society will be held to-day (Friday), at 8.30 P.M., at 11, Chandos-street, Cavendish-square, W., when Dr. Nathan Raw and Mr. D. Harvey J. Hartley, the society's representatives at the International Prison Congress held in August, 1925, will present their report, which will form the basis of the subsequent discussion. Lord Justice Atkin will be in the chair.

WE have received a decorative booklet on "Artificial Sunlight" from Watson and Sons (Electro-Medical), Ltd., of Parker-street, Kingsway, London, W.C. The cover and general production are intended to be in keeping with the subject and do not lack brightness. Messrs. Watson conclude that "it is impossible to cover all the exigencies of phototherapy with one type of equipment," and give an excellent account of the lamps which they supply.

CHELSEA CLINICAL SOCIETY.—The annual dinner of this society was held in the Café Royal, Regent-street, on Oct. 20th, when over 60 members and their guests assembled. The President, Dr. Seymour Price, was in the chair. The toast of the Society was proposed by Sir Holburt J. Waring, President of the Medical Society of London, who spoke of the value of medical societies in, amongst other things, training members to take part in municipal and civic affairs. There are, he said, far too few members of the medical profession at present in the House of Commons. Dr. Seymour Price, in reply, mentioned two innovations in the society's programme which would come into effect during the winter, first that the meetings would be held in the board room and not in the smaller club room, as formerly, of St. George's Hospital, and second that two dinner meetings would take place in the Florence Restaurant, Wardour-street, in the course of the session. Mr. Ivor Back, in a speech sparkling with amusing anecdotes, proposed the Visitors, coupled with the names of Sir Holburt Waring; Dr. Howard Humphris, President of the Hunterian Society; Dr. H. W. Armstead, President of the West London Medico-Chirurgical Society; and Dr. V. Dickinson, Master of the Society of Apothecaries. Dr. Dickinson replied on behalf

of the guests. The President was then proposed by Dr. K. E. Eckenstein, the treasurer of the society; Dr. Seymour Price defended himself satisfactorily, and paid a tribute to the work of the secretary, Mr. Ralph Thompson, who dutifully urged greater attendance at the society's meetings, tempering his reproof with humour.

Medical Diary.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

Monday, Oct. 26th.

ODONTOLOGY: at 8 P.M.
Presidential Address:
Mr. J. Lewin Payne: The Origin and Growth of the Odontological Society.
Paper:
Mr. A. T. Pitts and Mr. J. Howard Mummery: A Melanotic Epithelial Odontome in a Child.

Tuesday, Oct. 27th.

MEDICINE: at 5.30 P.M.
Clinical Meeting at the Middlesex Hospital, W.
Tea will be served at 5 P.M.
SOCIAL EVENING: at 8.30 P.M.
At 8.30 P.M. Fellows and their friends will be received by the President, Sir StClair Thomson.
At 9.30 P.M. the President will give a short address on Shakespeare as a Guide in the Art and Practice of Medicine.
There will be an interesting exhibition, arranged by Mr. C. J. S. Thompson, of the Wellcome Historical Medical Museum, to illustrate the subject of medicine in the Elizabethan period and the references to medicine in the plays of Shakespeare.

Wednesday, Oct. 28th.

COMPARATIVE MEDICINE: at 5 P.M.
Presidential Address by
Mr. Frederick T. G. Hobday.
Paper:
Dr. W. H. Andrews: Some Recent Advances in Our Knowledge of Plant Poisoning.
A discussion will follow, to be opened by Prof. A. J. Clark.
PSYCHIATRY: at 8.30 P.M.
Joint Meeting with the British Psychological Society (Medical Section).
Discussion on
The Early Treatment of Mental Disorders, to be opened by Sir Maurice Craig and Dr. William Brown.

Thursday, Oct. 29th.

UROLOGY: at 8.30 P.M.
Presidential Address:
Mr. R. H. Jocelyn Swan: Some Reflections upon Villous-covered Tumours of the Bladder.

MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W.
MONDAY, Oct. 26th.—8.30 P.M., Clinical Evening: Exhibition of Cases and Skiagrams.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

THE FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.
MONDAY, Oct. 26th, to SATURDAY, Oct. 31st.—Fellowship of Medicine lecture, Medical Society, 11, Chandos-street. Mon., 5.30, Dr. Marcus Paterson: The Treatment of Pulmonary Tuberculosis.—LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE, Endsleigh-gardens. Tues. and Thurs., Clinical demonstration by Dr. G. C. Low and Dr. Manson-Bahr.—ROYAL NORTHERN HOSPITAL, Holloway-road, N. Intensive Course in Medicine, Surgery, and the Special Departments.—ST. JOHN'S HOSPITAL, Leicester-square. Daily demonstrations in the Out-patient Department. Bi-weekly lectures. Tues., Dr. Barber: Immunity, Anaphylaxis. Thurs., Dr. Griffith: Principles of Treatment. General. Practical Pathological Demonstrations.—ST. PETER'S HOSPITAL, Henrietta-street, W.C., Special Course in Urology. Clinical work every afternoon and lecture.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.
THURSDAY, Oct. 29th.—3 P.M., Demonstration: Mr. W. E. Tanner: Selected Surgical Cases. 4.30 P.M., Lecture: Mr. H. W. Carson: The Differential Diagnosis of Conditions Simulating Appendicitis.
Daily: Clinics and demonstration in the Wards and various Out-patient Departments, Operations, &c.

UNIVERSITY COLLEGE, London.
MONDAY, Oct. 26th.—5 P.M., Mr. R. J. Lythgoe: The Physiology of Hearing and Vision. Fifth lecture.
WEDNESDAY.—5 P.M., Sixth lecture.

ST. JOHN'S HOSPITAL, Leicester-square, W.C.
TUESDAY, Oct. 27th.—5 P.M., Dr. H. W. Barber: Immunity. Anaphylaxis.
THURSDAY.—5 P.M., Dr. W. Griffith: Principles of Treatment. General.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC, Queen-square, Bloomsbury, W.C. 1.
POST-GRADUATE COURSE: OCTOBER-NOVEMBER, 1925.
CLINICAL LECTURES AND DEMONSTRATIONS.
MONDAY, Oct. 26th.—2 P.M., Out-patient Clinic: Dr. Hinds Howell. 3.30 P.M., The Psychical Aura in Epilepsy: Dr. Kinnier Wilson.
TUESDAY, Oct. 27th.—2 P.M., Out-patient Clinic: Dr. Walshe. 3.30 P.M., Compression Paraplegia from a Surgical Standpoint: Mr. Armour.
THURSDAY, Oct. 29th.—2 P.M., Out-patient Clinic: Dr. Kinnier Wilson. 3.30 P.M., Ocular Palsies: Dr. Gordon Holmes.
FRIDAY, Oct. 30th.—2 P.M., Out-patient Clinic: Dr. Adie. 3.30 P.M., Demonstration of Swedish Remedial Exercises (in Exercise Room): Mr. Elmquist.
The fee for the Course, including Pathology Lectures, is £5 5s. For those who hold Perpetual Tickets the fee is £3 3s.
COURSE OF LECTURES AND DEMONSTRATIONS ON THE PATHOLOGY OF THE NERVOUS SYSTEM.
THURSDAY, Oct. 29th.—12 noon, Periaxial Degeneration: Dr. J. G. Greenfield.
COURSE OF LECTURES AND DEMONSTRATIONS ON THE ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.
MONDAY, Oct. 26th.—12 noon, The Brain Stem and Cerebellum: Dr. J. L. Birley.
Dr. H. J. MacBride will give a COURSE of EIGHT CLINICAL DEMONSTRATIONS, chiefly on METHODS OF EXAMINATION OF THE NERVOUS SYSTEM, in the Wards of 10 A.M. on Tuesdays and Fridays, commencing Oct. 20th. The fee for this Course will be £2 2s.
Mr. Armour and Mr. Sargent operate at the Hospital on Tuesday and Friday mornings at 9 A.M., or at such other times as may be announced.
Any part of the Course may be taken separately. Special arrangements will be made for those unable to take the whole Course.
Fees should be paid to the Secretary of the Hospital at the Office on entering for the Course.
J. G. GREENFIELD, Dean of Medical School.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE COURSE.
TUESDAY, Oct. 27th.—4.15 P.M., Mr. W. H. Hey: Prognosis in Abdominal Disease.
FRIDAY.—4.15 P.M., Prof. E. D. Telford: The Diagnosis of Chronic Arthritis in Children.

ANCOATS HOSPITAL POST-GRADUATE LECTURES.
THURSDAY, Oct. 29th.—4.15 P.M., Mr. E. E Hughes: The Significance of Urinary Symptoms.

ROYAL INSTITUTE OF PUBLIC HEALTH, 37, Russell-square, W.C.
WEDNESDAY, Oct. 28th.—4 P.M., Dr. J. D. Rolleston: Prevention and Arrest of Diphtheria.

PEOPLE'S LEAGUE OF HEALTH, Fyvie Hall, Regent-street Polytechnic.
FRIDAY, Oct. 30th.—6 P.M., Prof. B. Collingwood: Sewage Systems of the Human Body.

Appointments.

BRENTNALL, C. P., M.B., Ch.B. Liverp., has been appointed Honorary Assistant Surgeon to the St. Mary's Hospitals, Manchester, and Honorary Assistant Gynæcological Surgeon to the Northern Hospital, Manchester.
BUTT, E. S., L.D.S., School Dentist for Cheshire.
COOK, F., M.B., B.S. Lond., F.R.C.S. Eng., Surgeon to Out-patients, Chelsea Hospital for Women.
DARWENT, C. T., L.R.C.P. & S. Edin., L.R.F.P.S. Glasg., Assistant Medical Officer to the Dundee Education Authority.
MENZIES, F. N. KAY, M.B., Ch.B., F.R.C.P. Edin., D.P.H., Medical Officer of Health and School Medical Officer to the London County Council.
THOMAS, H. A., M.B., Ch.B. Liverp., Assistant Medical Officer of Health and School Medical Officer for Denbighshire.
Royal Infirmary, Liverpool: NUTTALL, H. C. W., F.R.C.S. Eng., F.R.C.S. Edin., Honorary Assistant Surgeon; WILSON, J. St.G., Ch.M., F.R.C.S. Eng., Honorary Assistant Gynæcological and Obstetrical Surgeon; HERD, S. B., M.D., Ch.B. Liverp., Additional Honorary Assistant Gynæcological and Obstetrical Surgeon.
Salford Royal Hospital: BIRD, ELIZABETH, M.B., Ch.B. Glasg., Radiologist; EARL, C. J. C., M.R.C.P., L.R.C.S. Irel., Medical Registrar; and BROUGH, A. LOTHIAN, M.B., Ch.B. Glasg., District Medical Officer.

Vacancies.

For further information refer to the advertisement columns.
Aberdeen Royal Infirmary.—Asst. S. to Ear, Nose, and Throat Dept.
Anamallai Medical Assoc., S. India.—M.O.
Bengal and North-Western Railway Co., Ltd.—Sen. and Jun. M.O.'s. Rs.1200 and Rs.750 per mensem respectively.
Bolton County Borough.—Asst. M.O.H. and Asst. Sch. M.O. £600.
Brighton, New Sussex Hospital for Women and Children.—Hon. Radiologist.

Cardiff, Welsh National School of Medicine.—Asst. to Surg. Unit. £350.
Charing Cross Hospital Medical School.—Lectureship in Hygiene.
Chelsea Hospital for Women.—Anæsthetist. £21.
City of London Hospital for Diseases of the Heart, Victoria Park, E.—H.P. At rate of £100.
Colchester, Severalls Mental Hospital.—Second Asst. M.O. £630.
Crichton Royal Mental Hospital, Dumfries.—Clin. Pathologist. £400.
Eastbourne, Princess Alice Memorial Hospital.—Res. H.S. At rate of £175.
Essex Administration County.—Asst. Tubercl. O. £600.
Greenwich, Dreadnought Hospital.—S. in charge of Out-patients.
Grove Park Hospital, Lee, S.E.—Med. Supt. £770.
Hayward's Heath Hospital.—Hon. Ophth. S.
Hospital for Sick Children, Great Ormond-street, W.C.—Med. Reg. and Pathologist. £300.
Infectious Hospitals Service, Metropolitan Asylums Board.—Jun. Asst. M.O. £500.
Leicester Royal Infirmary.—H.S. and H.P. At rate of £125 and £120 respectively.
Liverpool Hospital for Consumption and Diseases of Chest, Mount Pleasant.—Hon. Asst. P.
Manchester City Education Committee.—Asst. Sch. M.O. £600.
Middlesex County Council.—Asst. M.O. £600.
Northampton General Hospital.—Hon. Asst. S.
North Middlesex Hospital, Edmonton, N.—Asst. S. £500.
Oxford, Warneford Mental Hospital.—Asst. M.O. £250.
Perthshire Joint Medical Service Scheme.—First Asst. M.O. £600.
Plaistow Fever Hospital, E.—Second Asst. M.O. At rate of £200.
Poplar Hospital for Accidents, East India Dock-road, E.—Second Res. Surg. O. £175.
Queen's Hospital for Children, Hackney-road, Bethnal Green, E.—Asst. S.
Royal Free Hospital, Gray's Inn-road, W.C.—H.P., First H.S., Second H.S., and Asst. Cas. O.
St. Mary's Hospital for Women and Children, Plaistow, E.—Res. M.O. and Asst. Res. M.O. At rate of £175 and £130 respectively. Also Hon. Dental S.
St. Pancras Dispensary, 39, Oakley-sq., N.W.—Res. M.O. £225.
Stoke-on-Trent, North Staffs, Royal Infirmary.—H.S. £150. Also H.P. £125.
Stourbridge, Worcestershire, Corbett Hospital.—H.S. £150.
Wakefield, City of.—Deputy M.O.H. £600.
Wallasey, Victoria Central Hospital.—Jun. H.S. £100.
Westminster Hospital, S.W.—M.O. Two Asst. M.O.'s to X Ray Dept. Also Asst. Path.

THE Chief Inspector of Factories, Home Office, London, S.W., announces a vacant appointment for a Certifying Factory Surgeon at Friockheim, Forfarshire,

Births, Marriages, and Deaths.

BIRTHS.

COSSHAM.—On Oct. 14th, at "St. Aldwyns," Cirencester, Glos., the wife of D. G. Cossham, M.B., of a daughter.
FARMER.—On Oct. 12th, the wife of F. J. Farmer, L.D.S. R.C.S., of a son.
WELCH.—On Oct. 17th, at West Norwood, the wife of Cyril H. Welch, M.D., of a daughter.

MARRIAGES.

ANDERSON—WHARTON.—On Oct. 9th, at St. Nicholas's Church, Great Yarmouth, Archibald Stirling Kennedy Anderson, D.S.O., M.C., M.A., M.B., Ch.B., D.P.H., to Joyce, elder daughter of Mr. and Mrs. W. S. Wharton, of Great Yarmouth.
LAUDER—THOMPSON.—On Oct. 3rd, at St. James's, Sussex-gardens, Harold Victor Robert Thomas Lauder, M.R.C.S., L.R.C.P., to Phyllis Anna Lynn, daughter of the late Alfred Lynn Thompson and Mrs. Lynn Thompson, of Westbourne-street, Hyde Park, W.

DEATHS.

AUSTIN.—On Oct. 12th, at Fernleigh, Lingfield, Sydney Charles Austin, M.R.C.S., aged 81.
GOODALE.—On Oct. 15th, at Little Bowyer, Wrotham, Kent, Henry Goodale, M.R.C.S.
HAGGARD.—On Oct. 18th, at St. Bartholomew's Hospital, Thomas Barker Amyand Haggard, late Capt. R.A.M.C., B.A., M.R.C.S., L.R.C.P., aged 50.
HINDE.—On Oct. 20th, at Mundesley, Eric Clark Hinde, M.B., B.S. Lond., aged 30.
KELLETT.—Alfred Featherstone Kellett, M.B., B.S., B.A., St. John's College, Cambridge, Associate of Birmingham University; for 33 years practising at Lewisham, S.E., aged 59.
ORRIN.—On Oct. 18th, at "Ferndale," Halstead, Essex, Beth, the wife of Herbert Charles Orrin, O.B.E., F.R.C.S., Surgeon, Ministry of Pensions Hospital, Newcastle-on-Tyne.
PRITCHARD.—On Oct. 16th, at St. Teresa, Chesham Bois, Bucks, Urban Pritchard, M.D., F.R.C.S., in his 81st year.
ROWLAND.—On Oct. 18th, at Albert-mansions, Battersea Park, John William Rowland, C.M.G., M.B., C.M.
SERPELL.—On Oct. 11th, at a nursing home in Plymouth, after operation, Hugh Hamilton Serpell, M.R.C.S., L.R.C.P., late Lieut.-Colonel R.A.M.C., of Polyphant House, Lewannick, Cornwall, aged 48.
WHITSED.—On Oct. 14th, suddenly, at "Bukloh," Tilehurst, Reading, James Longland Whitsed, M.R.C.S.E., L.R.C.P., aged 74 years.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

THE EQUABLE COOLING POWER OF ALPINE HEALTH RESORTS.

BY LEONARD HILL, M.B.LOND., F.R.S.,
DIRECTOR OF THE DEPARTMENT OF APPLIED PHYSIOLOGY, MEDICAL RESEARCH COUNCIL;
AND
BERNARD HUDSON, M.D. CAMB., M.R.C.P. LOND.,
SWISS FEDERAL DIPLOMA; PHYSICIAN TO VICTORIA SANATORIUM, DAVOS-PLATZ, SWITZERLAND.

AMONG many other things of interest, the recent Climatological Congress at Davos brought out the fact that one of the chief points about the Alpine climate is the absence of high wind and the equable cooling power of the air, as measured by the kata-thermometer. Dr. Dorno, the distinguished meteorologist at Davos, has made observations illustrating the latter fact, and Dr. Paul Gotz has recently communicated to us figures which show that this equable cooling power holds good also for Arosa. On a balcony with south aspect, the average dry kata cooling power for the different months of the year varied there only 7½ to 15. In the open at Davos the variation is from 10 to 24. The Davos valley, running north to south, is peculiarly sheltered, and the perfectly straight, slender growth of the pines illustrates the fact that neither gales nor stunting winds blow there. The variation of dry kata cooling power is very great in the changeable and windy climate of Great Britain, in the open from 7 to 50 or even 60, with a monthly average varying from 21–40, but confined city courts are sheltered, and offer near the ground equable cooling power, as is shown by the anemometer and temperature records taken in a court in Camden-square, from which dry kata thermometer cooling powers of 5½ to 10 were calculated for the year. In comparison may also be cited the monthly average cooling powers calculated for Sierra Leone 7½–12, Kimberley, S.A., 13–25, and Quebec 18–63.

In the Alpine health resorts the winter sunshine and ultra-violet rays have high values in contrast to the city court-yard. The acetone blue gauge shows that the ultra-violet radiation in Kingsway is about one-third of that in clean country air. In the Alps the hours of winter sunshine equal those in summer on the south coast. Moreover, the physiological saturation deficit is higher in the Alps—that is, the difference between the weight of water vapour in the inspired air and that in the expired air which has been saturated and warmed in the lungs. The phthisical patient gets advantage not only from the sunshine and ultra-violet radiation, but also from the high evaporative power of the air acting upon the lungs and promoting the passage of blood, lymph, and secretion through the respiratory membrane. The attenuated cool air, by promoting deeper breathing, increases these effects. He also gets advantage from absence of warm, close days and cold wind and from the equable cooling power. The cooling power in the Alps is just within those limits which are felt to be fresh and pleasant, particularly when there is available a source of radiant energy such as is given by sun- and sky-shine. The patient is pleasantly cooled by the winter cooling power of the Alpine air, and his resting metabolism is kept up at a high level, his general well-being and his appetite thus being improved. The increase of resting metabolism found by one of us (L. H.) and Argyll Campbell in tuberculous patients submitted to open-air treatment has been confirmed recently by observations made by Dr. Vogel-Eysern at Davos. The patient in the Alps is never overheated whilst in the cool, shady air with high drying power, and great care must be taken that he does not become overheated in enclosed balconies or sun-boxes by direct exposure to hot sun and insufficient circulation of cooling air around him. He can get all the ultra-violet rays he needs from sky-shine and from the direct sun of the cool early morning hours. The absence of high wind prevents discomfort arising from too high a cooling power, and allows light clothing to be worn and does not make exercise difficult, for the patient is not tempted to walk too far with the wind behind him and then have to struggle back against it, arriving home in a state of fatigue, having derived harm instead of benefit from his exercise. Also, owing to the clear, dry, windless air, the patient is enabled to sit down and rest in comfort when necessary, whether in winter or in summer. These advantages, together with the beautiful and exhilarating scenery and the pageant of winter sports to watch, are offered by the Alps. We can, in our cities, make good the absence of sunshine by the use of arc lamps, a great help, but it is not possible to make good all the other things which appeal particularly to young adults.

While benefit may thus be derived by patients suffering from pulmonary tuberculosis in the Swiss Alps, it should be mentioned that only those cases should be sent who have sufficient resistance and power of response to react in the right way to the altered conditions which obtain at a height of 5000 feet or thereabouts. It is no use sending out to the mountains cases in the last stages with active spreading disease, emaciated, worn out, and with no reactive power. It is early cases and even those in later stages, if with sufficient resisting power, which make satisfactory and stable recoveries in the Alps if sufficient time is given. An average sojourn certainly should not be for less than six months, and it is better still to devote one year and even longer, with periods of change of environment when necessary, if permanent results are to be obtained. The danger of catarrhal infections during periods of change of environment must be borne in mind. The patient who returns from the Alpine open-air treatment to crowded trains and cities is susceptible to catarrhal infections against which the citizen is more or less vaccinated by frequent small doses.

KARLSBAD MEDICAL WEEK.

SEVEN years ago Karlsbad instituted an international medical week, consisting of lectures and demonstrations with special reference to the famous Czecho-Slovakian baths. The seventh of these short courses was held last month and was attended by a large medical public from many countries. Prof. Otfried Müller, of Tübingen, described the Müller-Weiss method of examining the capillaries by micro-photography. Though the capillaries are regulated and controlled by the central nervous system, they cannot be considered a "peripheral heart." Certain forms of neurosis caused irregularity in the action of these vessels, and he spoke of this phenomenon in connexion with gastric ulcer, various forms of catarrh, neurotic muscle pains, and high blood pressure in the absence of kidney disease. Dr. Alfred Gigon, of Basle, set forth the present position of our knowledge of metabolism, and described the blood changes observed after courses of Karlsbad waters. Prof. von Hösslin, of Berlin, showed that in a dying patient when the pulse and the heart sounds were imperceptible the electrocardiogram gave evidence that the heart continued to function for some considerable time. Prof. Sellheim, of Halle, dealt with the improvement of methods of blood examination in connexion with gynæcology, and emphasised the advantages of the so-called "Lüttge-Mertz-Berg organic extract serum reaction" over the Abderhalden reaction in the early diagnosis of pregnancy. A reaction is obtained with the new method within half an hour. This reaction can also be used, he claimed, to determine the sex of the fœtus. Dr. Josefson, of Stockholm, discussed the connexion between personality and the organs of internal secretion, showing that there was a possibility of moulding the personality at an early stage by adjustment of the endocrine system. Dr. Balin, of Budapest, gave an interesting lecture on auto-digestion and the formation of fatty acid in the tissues of a patient with gastric ulcer. His researches had shown that the hydrogen-ion concentration in such patients' blood was high. The administration of alkalies caused no increase of fatty acid in the urine; the tissues retain the alkali. Prof. Mühlens, of Hamburg, and Prof. R. Kraus, of Vienna, discussed recent progress in the treatment and prophylaxis of tropical diseases, with special reference to South America. It is of interest to note that "Bayer 205" is now called "Germanin." Dr. Tannhauser, of Heidelberg, discussed the relations of obesity to the endocrine organs, and classified several types of that condition. Prof. di Gaspero, of Graz, dealt with the biological functions of the skin, and the particular effects of hydro-, thermo-, and balneo-therapy on the organism, acting through the skin as a medium. The course was organised by Dr. Edgar Ganz, of Karlsbad, and proved pleasant and profitable to all who took part.

LONGEVITY OF THE LEARNED.

To the Editor of THE LANCET.

SIR,—The annotation in THE LANCET of Oct. 10th which deals with literary death-beds might at first sight lead one to suppose that men of letters during the nineteenth century were mostly short-lived. Yet there were notable exceptions to what was probably not meant to be a generalisation. Mr. Stewart Ellis, author of "Mainly Victorian," in a letter to the present writer, says amusingly: "I rather pride myself upon the closing scenes of my subjects' lives," but he draws no macabre conclusions therefrom.

Viewed as a whole, men of letters and the learned generally have often reached great ages. In his well-known book, invaluable up to its date, "Remarks on the Influence of Mental Cultivation and Mental Excitement upon Health," Dr. Amariah Brigham, of Boston, Mass., appends to his essay a table containing over 280 names of celebrities in all ages and the years of their earthly pilgrimage. Some of the centenarian records included in the list are perhaps fabulous. Thus the list is headed by Hippocrates, father of medicine, who, one tradition asserted, died at the prodigious age of 109; more modest estimates of his age are 100 and 80 respectively. Gorgias, the sophist, is said to have reached 107 years. Fontenelle, the man of universal science, was a centenarian, as also were Saadi, the Persian poet, and Herodian, the historian of the Roman emperors. Zeno, the stoic, Simonides, the poet and philosopher, and Isocrates, the orator, were said to be 98 when they died, and tradition asserts that the first named had bitten out his tongue and had spat it in the face of a tyrant many years previously. Among the nonagenarians numbers increase. They are headed traditionally by Sophocles, who was glad in his day to escape from the importunities of Eros, and they include Hobbes, of "Leviathan" fame, and Sir Christopher Wren. Octogenarian men of science or learning are numerous in Dr. Brigham's category, and among them we find Harvey, Roscoe, Kant, Arthur Young, Mead, and Buffon. Dr. Brigham collected his statistics carefully, but did not bring his record beyond 1832, the year of the first publication of his book. Hence the list would be greatly extended by including nineteenth century names such as Darwin, Wallace, Richard Owen, and a host of others. The expectation of life is, of course, far greater now than in the 'thirties of last century. "England is superior in salubrity to any other country in Europe. The average mortality throughout the whole of England and Wales has been, of late years, about 1 in 60 . . . In London the annual mortality in the middle of the last [eighteenth] century was 1 in 20." Thus wrote Dr. Brigham in 1832, and he quotes Dr. Bisset Hawkins, author of "Elements of Medical Statistics" (1829), who notes that in Geneva good mortuary tables have been preserved since 1560, and that the probability of life there during the seventeenth century was no higher than 11½ years.

Writing as an American, Brigham envies England its health and sanity. He is of opinion that men of letters shorten their lives by neglecting their digestions, but he differs from his contemporaries in attributing dyspepsia mainly to "irritation of the brain," the diagnosis made, as you recall, in the case of Frank Smedley. This irritation, thinks Brigham, is only rarely due to disease. More often it is simply the result of mental tension, which can be relieved by a proper attention to exercise and general health. He notes incidentally that American women of the easy classes are lamentably feeble owing to their sedentary habits, and he urges on the lettered of either sex the necessity for more physical activity.

Athletic exercises, undertaken for pleasure or for health reasons, were neglected in Brigham's day all over the world, and children's brains were crammed, à la Paul Dombey, at the expense of their bodies. Men of letters everywhere were, like the American women, home-staying people, and they suffered from having been often treated as mental prodigies during their early education.

I am, Sir, yours faithfully,

Oct. 12th, 1925. BIBLIOGRAPHER.

THE "EUPHOROS" SELF-ADJUSTING ARM-SLING.

To the Editor of THE LANCET.

SIR,—Far more important than the manner of supporting the arm-sling seems to me the correct way of fixing the sling itself. Very often one sees the arm fixed in the wrong way, as the illustration of the "Euphoros" self-adjusting arm-sling (THE LANCET, Oct. 10th, p. 790) shows. To secure immobility of the arm, the outward part of the sling must be put over the sound shoulder. Only then will the arm be immobilised, as a simple try will prove.

I am, Sir, yours faithfully,

E. C. VAN LEERSUM.

Nederlandsch Instituut Voor Volksvoeding,
Amsterdam, Oct. 16th, 1925.

APOPLEXY OF THE SOFT PALATE.

To the Editor of THE LANCET.

SIR,—I have recently had a case similar to those described in THE LANCET of Oct. 3rd (p. 734). In September, 1924, I saw a lady who was very much alarmed in consequence of a hæmorrhage which she thought came from the lung. Nothing to account for the bleeding could be found after careful examination of the chest; on inspecting the fauces, however, small capillary cavities could be seen, and the patient was satisfied when told the hæmorrhage proceeded from one of these which had given way. In August of this year, when in London, she had a similar attack, when she consulted Dr. F. G. Crookshank, who found the same condition existing and reassured her.

I am, Sir, yours faithfully,

Ilkley, Oct. 16th, 1925. W. R. BATES.

WE are informed that the Schering specialties (Atophan, Veramon, &c.) are now distributed by the firm of Schering, Limited, 3, Lloyd's-avenue, London, E.C. 3, to whom application for literature and samples should be made.

THE LANCET

A Journal of British and Foreign Medicine, Surgery, Obstetrics, Physiology, Chemistry, Pharmacology, Public Health, and News.

Telegrams—LANCET, WESTRAND LONDON *Telephones*—GERRARD 4314 & 4315 *Offices*—423, Strand, London, W.C.2

No. XVIII. OF VOL. II., 1925. LONDON, SATURDAY, OCTOBER 31, 1925. Pp. 112—Price 1s.
No. 5331. Vol. CCIX. Founded 1823. Registered as a Newspaper. Published Weekly. Annual Subscription Inland £2 2s. Abroad £2 10s

OXFORD MEDICAL PUBLICATIONS.

SEE PAGE 4.

Now Ready. Demy 8vo. Pp. viii.+284. With 23 Plates and 21 Figs. in Text. Price 15s. (postage 9d.).

SELECTED PAPERS, SURGICAL AND PATHOLOGICAL. By F. T. PAUL, D.Sc. Liverp. (Hon. Caus.), Ch.M. Liverp., F.R.C.P., Consulting Surgeon, Liverpool Royal Infirmary.
Baillière, Tindall & Cox, 8, Henrietta-st., Covent Garden, W.C.2.

Ready Next Week. Fourth Edition. Royal 8vo. Pp. xx.+1233. With 109 Figs. Price 30s. (postage 1s.).

PHYSIOLOGICAL CHEMISTRY. By ALBERT P. MATHEWS, Ph.D., Professor of Biochemistry, University of Cincinnati.
Baillière, Tindall & Cox, 8, Henrietta-st., Covent Garden, London, W.C.

J. & A. CHURCHILL'S NEW SERIES.

RECENT ADVANCES.

Ready.

MEDICINE. By BEAUMONT & DODDS. 2nd Ed. 10s. 6d. net.
PHYSIOLOGY. By C. LOVATT EVANS, F.R.S. 10s. 6d. net.

In Preparation.

OBSTETRICS AND GYNÆCOLOGY. By A. W. BOURNE, F.R.C.S., Obstetric Surgeon, St. Mary's Hospital.
SURGERY. By J. E. H. ROBERTS, F.R.C.S., Assistant Surgeon, St. Bartholomew's Hosp.
BIOCHEMISTRY. By J. PRYDE, Dept. Physiol., Univ. Coll., Cardiff.
London: J. & A. Churchill, 7, Great Marlborough-street, W.1.

STERILITY IN WOMEN. By ARTHUR E. GILES, M.D., B.Sc., Ch.B., F.R.C.S., M.R.C.P., Senior Surgeon to the Chelsea Hospital for Women, Gynæcologist to the Prince of Wales's General Hospital, Tottenham.
Demy 8vo. Cloth. 243 pages, Illustrated. Price 10s. net.
"For the General Practitioner this is an ideal book, full of information."—MEDICAL WORLD.
"The best that has been written on the subject."—BRIT. MED. JR.
Oxford University Press,
Humphrey Milford, Amen House, London, E.C.4.

BY THE SAME AUTHOR.

DISEASES OF WOMEN (with Sir JOHN BLAND-SUTTON). 7th Ed. William Heinemann.
GYNÆCOLOGICAL DIAGNOSIS } Baillière,
AFTER RESULTS OF ABDOMINAL OPERATIONS } Tindall & Cox

SYPHILIS AND VENEREAL DISEASES. By C. F. MARSHALL, M.Sc., M.D., F.R.C.S.Eng.; and E. G. FFRENCH, M.D., F.R.C.S. Edin., M.R.C.P. Lond., Lieut.-Col. R.A.M.C. (Ret.), late O.C. Military Hospital, Rochester Row, S.W.
Fourth Edition, revised and illustrated with 7 Coloured Plates and numerous Figures. Price 15s.
London: Baillière, Tindall & Cox, 8, Henrietta-st., Covent Garden.

HYPNOTISM AND TREATMENT BY SUGGESTION. [5s. net.
4th Ed.]
By ALBERT E. DAVIS, F.R.C.S. Ed., L.R.C.P., Hon. Physician to the Liverpool Psycho-Therapeutic Clinic.
"A fascinating book."—THE DAILY NEWS.
Putnam's Sons Ltd., London.

ON THE BREAST. By DUNCAN C. L. FITZWILLIAMS, C.M.G., M.D., Ch.M., F.R.C.S. Ed. and Eng.
Royal 8vo. 456 pp. 2 Plates, 166 Illustrations. 30s. net.
LANCET.—"The book is packed with accurate clinical observations and bears evidence throughout of extensive clinical experience and wide reading on the part of the author."
Wm. Heinemann (Medical Books) Ltd., 20, Bedford-street, London, W.C.2.

Third Edition. With many Illustrations. 12s. 9d. net.

TREATMENT OF DISEASES OF THE SKIN. By KNOWSLEY SIBLEY, M.D.Camb.
London: Edward Arnold & Co., 41 and 43, Maddox-street, W. 1.

A HANDBOOK OF AURAL SURGERY. By WILLIAM WILSON,
Oto-Laryngologist, St. John's Ear Hospital; Withington, Crumpsall and Booth Hall Hospitals, &c., Manchester.
JOURNAL OF LARYNGOLOGY—"Dr. Wilson has succeeded—the book can be confidently recommended."
MEDICAL PRESS—"Interesting and even refreshing—has characteristics of its own—we recommend them to those who teach as much as to those who learn."
JOURNAL OF THE AMERICAN MED. ASSOCIATION.—"A veritable compendium of information."
15s. net.
Sherratt & Hughes. Manchester.

Pp. viii.+262, with 51 Illustrations. Price 8s. 6d.

DISORDERS OF THE HEART. By ALEXANDER BLACKHALL-MORISON, M.D., F.R.C.P., Consulting Physician to the Royal Northern Hospital, &c.
"The book merits careful perusal and consideration, as it contains many striking criticisms of current theories and a new marshalling of ascertained facts."—BRITISH MEDICAL JOURNAL.
Baillière, Tindall & Cox, 8, Henrietta St., Covent Garden, W.C.2.

BY LIEUT.-COL. ROBERT HENRY ELLIOT, M.D., B.S. Lond., F.R.C.S. Eng., I.M.S. retd.

A TREATISE ON GLAUCOMA.
2nd Edition, Revised and Enlarged. 30s. net.

TROPICAL OPHTHALMOLOGY.
With 7 Plates and 117 Illustrations. 31s. 6d. net.
Spanish and French Editions, 1922.

THE CARE OF EYE CASES: 12s. 6d. net.
A MANUAL FOR NURSES, PRACTITIONERS, AND STUDENTS.
Oxford University Press.

GLAUCOMA: 4s. net.
A HANDBOOK FOR THE GENERAL PRACTITIONER.

THE INDIAN OPERATION OF COUCHING FOR CATARACT
7s. 6d. net. H. K. Lewis and Co. Ltd.

TAYLOR & POULTON'S MEDICINE

New Edition, with Sections on Neurology by C. P. SYMONDS, M.D., and on Skin by H. W. BARBER, M.B., F.R.C.P.

THIRTEENTH EDITION. 1063 pages. 48 Plates (8 Coloured). 93 Text-figures. Price 28s. net; postage 1s.

"Dr. E. P. Poulton has again produced a revised edition of the late Sir Frederick Taylor's famous text-book. The extent of revision rendered necessary by the advances of medical science may be gathered from the fact that new articles have been added dealing with meliodosis, tularæmia, ectoscopy, manganese poisoning, Mönckeberg's degeneration, the recent work on the ætiology of cancer, and half a dozen other subjects, whilst the authors have had to re-write or largely revise their previous articles on anaphylaxis, jaundice, pernicious anæmia, the spleen, cerebro-spinal fluid, epilepsy, and many other equally important topics. In addition to these revisions and amplifications, there are several new features which call for special comment. . . . . To have accomplished all this within three years of the previous edition is a tribute not only to the learning and industry of Dr. Poulton and his collaborators, but also to the deserved popularity of the work among students and practitioners."—THE LANCET.

London: J. & A. CHURCHILL, 7, Great Marlborough Street, W. 1.

Schering

A fine product from the celebrated laboratories of
E. SCHERING - *a guarantee of purity and reliability.*

ATOPHAN

TRADE MARK

Produces, within one to two hours, an increase of 100-300% in the amount of uric acid excreted in the urine. It is also a powerful antiphlogistic, antipyretic, analgesic and cholagogue.

The summation of these properties in one preparation marks ATOPHAN as the remedy, par excellence, for the treatment of **Acute and Chronic Rheumatism and Gout, Ischias, Neuralgia, Lumbago, Iritis, Pleurisy, etc.**

The immediate use of ATOPHAN for acute articular rheumatism prevents cardiac complications and other ill-effects associated with salicylic therapy.

Samples and Literature on request from the Importers:

SCHERING, LTD.,
3, LLOYD'S AVENUE, LONDON, E.C.3.

Some Medical Opinions.
ATOPHAN.

"Last night I was suddenly taken with an acute attack of gout in the left great toe. After a very painful and restless night I took 3 of your tablets in the morning, following it up with 2 in the afternoon, with the result, I was able to get up and attend to my surgery this evening."

"I have been using *Atophan* for some time, notably on a case of pain in the back due to rheumatism of muscular origin, in which I have previously tried every treatment I could think of. *Atophan* cut short the attacks very quickly and also seems to have had a curative effect for, after 6 doses or so, the attacks lessened in severity and finally ceased."

"I have used *Atophan* tablets in a case of persistent skin irritation, due, in my opinion, to uric acid in the blood, the patient being myself. Though not quite cured, I have received so much benefit that I should like to continue the treatment."

"I have already tried the *Atophan* on a case of fibrositis of the muscles of the neck aud both scapular regions, and have obtained excellent results."

"The *Atophan* tablets arrived just as I was suffering from a severe attack of lumbago and gave me great relief. I should not like to be without them in the future."

Use LESLIES ZŌPLA Plaster

FOR PERFECT RESULTS

Tenaciously Self-adhesive, really Non-irritating, Antiseptic.

IT STANDS THE STRAIN

ON LIGHT AND HEAVY CLOTHS, WHITE OR FLESH. ALSO ON HOLLAND. ALL WIDTHS AND SIZES.

Write for Samples.

USE ALSO OUR HOLLAND STRAPPING.

LESLIES LTD., High Street, Walthamstow, LONDON, E.17.

AMBRINE — Dr. Barthe de Sandfort's preparation for the treatment of **BURNS**

CUPRASE — Dr. Gaube du Gers' Colloid Copper for the Treatment of **CANCER**

KINECTINE — Dr. Mouneyrat's Organic Arsenic and Quinine for the treatment of **INFLUENZA** and **ACUTE CORYZA**

FULL PARTICULARS FROM

The ANGLO-FRENCH DRUG COMPANY, Ltd., 238a, Gray's Inn Road, LONDON W.C. 1.

THE LANCET

No. 5331. LONDON, SATURDAY, OCTOBER 31, 1925. CCIX.

CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT.

CAMERON LECTURES. By Prof. HARVEY CUSHING, C.B., F.R.C.S. Lecture II. The Pituitary Gland as Now Known 899

REMARKS on the Physiology of Muscular Action. By A. S. BLUNDELL BANKART, F.R.C.S. 906

AN ADDRESS on the Prevention and Arrest of Rheumatic Disease. By MATTHEW BURROW RAY, M.D. 949

ORIGINAL ARTICLES.

On the Nature of Urinary Protein, with Special Reference to Cases of Eclampsia. By ALEXANDER HYND, D.Sc. 910

A Case of Abdominal Lymphadenoma. By L. R. SHORE, M.B., M.R.C.P., and W. A. YOUNG, B.Sc., M.B. 915

CLINICAL AND LABORATORY NOTES.

The Globulin and Colloidal Gold Reactions of the Cerebro-spinal Fluid after the Malarial Treatment of G.P.I. By J. ERNEST NICOLE, L.M.S.S.A., and John P. STEEL, M.B., Ch.B. 917

Traumatic Lesion of the Cauda Equina: Laminectomy; Recovery. By E. ROCK CARLING, F.R.C.S., and HILDRED CARLILL, M.D., M.R.C.P. 917

Intestinal Hæmorrhage Controlled by Coagulen (Ciba) during a Severe Attack of Typhoid Fever. By Surg. Lt.-Commander L. C. DUNDAS IRVINE .. 918

MEDICAL SOCIETIES.

Royal Society of Medicine: Section of Surgery: The Teaching and Practice of Surgery 918

Section of Epidemiology and State Medicine 919

Society of Superintendents of Tuberculosis Institutions: Pulmonary Tuberculosis 921

NEW INVENTIONS.

The Lewco Stove.—(*Illustrated*) 924

REVIEWS AND NOTICES OF BOOKS.

Dental Infections, Oral and Systemic. By Weston A. Price, D.D.S., M.S. 921

The Early Diagnosis of the Acute Abdomen. By Zachary Cope, M.D., M.S. 922

Chirurgie der Niere und des Harnleiters. By Prof. Dr. J. Israel and Dr. W. Israel. 922

Pathogénie des Calculs Biliaires et Indications Opératoires. By Prof. Thorkild Rovsing 922

Nature of Enzyme Action. By Sir W. M. Bayliss, D.Sc., F.R.S. 922

Physical Chemistry, its Bearing on Biology and Medicine. By Prof. James C. Philip, D.Sc... 922

Electro-therapy and Ionic Medication. By Harold H. U. Cross, Ph.D. 923

Sanitation Supplements of Tropical Diseases Bulletin 923

Journal of Pathology, &c. 923

Journal of Physiology 923

LEADING ARTICLES.

WALES AND ITS MEDICAL SCHOOL 925

THE ÆTIOLOGY OF ECLAMPSIA 925

MALARIA AND AGRICULTURE IN BENGAL 926

SURGICAL DEVOLUTION ... 927

ANNOTATIONS.

The Economic Aspect of Smoke 928

An Encyclopædia of Industrial Hygiene 928

Prognosis in Bilateral Breast Cancer 929

Native Diets 929

The Targowla Reaction for Syphilis 929

Dental Propaganda 930

A Mexican Public Health Bulletin 930

Before and After the Panel Conference 930

The Size of the Thymus .. 931

The London School of Hygiene, &c. 931

Shakespeare and Medicine 931

MODERN TECHNIQUE IN TREATMENT.

CLXV.—The Treatment of Infantile Paralysis. By ROBERT OLLERENSHAW, M.D., F.R.C.S. 932

SPECIAL ARTICLES.

The Panel Conference: Professional Unity and Discipline 934

Scotland: James Mackenzie Institute for Clinical Research, St. Andrews 936

Paris: Hygiene and Budgets in Paris 937

Notes from Canada: Lord Dawson at McGill University 937

PUBLIC HEALTH SERVICES.

Reports of Medical Officers of Health 938

Mental Hospital Reports.. 940

Infectious Disease in England and Wales 940

CORRESPONDENCE.

Active Immunisation Against Diphtheria (Prof. Clemens Pirquet) 941

Standardisation of Bacterial Vaccines (Major H. C. Brown) 941

Awareness of the Body Surface (Dr. Hector M. Walker) 941

Pioneers in Tropical Medicine (Dr. Andrew Balfour) 942

X Raying of Teeth: The Latest Craze (Sir Gould May) 942

Hospitals, General and Special (Capt. J. H. Johnson) 942

Respiratory Catarrh in Children (Dr. Ivy E. Haslam) 943

Premature Burial (Dr. L. Vintras) 943

Luminal, Borax, or Bromide in Epilepsy (Dr. Harry Campbell) 943

MEDICAL NEWS.

University of London..... 944

The Semon Lecture: University of London... 944

Royal College of Surgeons of England 944

Queen Charlotte's Maternity Hospital 944

Joint Tuberculosis Council 944

Fellowship of Medicine and Post-Graduate Medical Association..... 944

Royal College of Physicians of Edinburgh, &c. 944

Royal College of Surgeons of Edinburgh 944

Norfolk and Norwich Eye Infirmary 916

Doncaster Infirmary..... 916

Sheffield Hospital Site 916

Salford Analyst's Report . 921

Royal Commission on National Health Insurance..... 944

Royal Society of Arts..... 945

Medical Practitioners Union 945

British Medical Association: Council Dinner... 945

Orthopædic After-Care.... 945

Lancashire Insurance Committee..... 945

Royal Society of Medicine 946

London Hospital Medical College 946

Liverpool: Royal Southern Hospital Extension..... 946

Hackney Maternity Centre 946

Cancer Hospital..... 946

Judgment for Durban Doctor..... 946

Newcastle: Post-Graduate Study 946

Guest Hospital and Eye Infirmary, Dudley..... 946

Rontgen Society 946

Colwyn Bay Hospital 946

University of Manchester.. 946

Cancer Campaign in Manchester..... 946

The late Dr. T. Drysdale .. 946

West Riding Association of Edinburgh University Graduates..... 947

Norwood Sanatorium 947

Doncaster's Open-air School for Defective Children.. 947

Hospitals and Road Accidents 947

The late Dr. E. C. Hinde 947

Donations and Bequests .. 947

Bradford's Hospital Appeal 949

THE SERVICES.

Royal Naval Medical Service.—Royal Army Medical Corps.—Royal Air Force.—Indian Medical Service 943

NOTES, COMMENTS, AND ABSTRACTS.

Public Health in the United Provinces 952

Primitive Morals 952

Efficiency of Mercury-Vapour Lamps 952

Medical Diary 947

Appointments 948

Vacancies 949

Births, Marriages, Deaths 949

TWO NEW EDITIONS.

JUST PUBLISHED. THIRTEENTH Edition. Thoroughly Revised. With 9 Coloured Plates and 278 other Illustrations. Demy 8vo. **21s.** net; postage 9d.

SWANZY'S HANDBOOK OF

DISEASES OF THE EYE AND THEIR TREATMENT

Revised and edited by **LOUIS WERNER**, M.B., F.R.C.S.I., Professor of Ophthalmology, University College, Dublin; and Examiner in Ophthalmology, Dublin University, &c.

JUST PUBLISHED. SECOND Edition. Thoroughly Revised. With 159 Illustrations (6 in Colours) from Original Drawings and Photographs. Demy 8vo. **12s. 6d.** net; postage 9d.

THE PATHOLOGY OF TUMOURS

By **E. H. KETTLE**, M.D., B.S.Lond., Professor of Pathology and Bacteriology, Welsh National School of Medicine, Cardiff; formerly Pathologist, St. Mary's Hospital, and Lecturer on Pathology, St. Mary's Hospital Medical School, London.

London: H. K. LEWIS & Co. Ltd., 136 Gower Street, W.C. 1.

BROADWAY HOUSE BOOKS

THE EVOLUTION OF ANATOMY. By CHARLES SINGER, M.D., D.Litt., &c. With 22 plates and 117 text figures. 12s. 6d. n.

"Just the sort of book that is needed. The story, so lucidly told, should stir the imagination of even the dullest student and appeal to everyone interested in the history of culture. Not the least of its merits is the valuable collection of illustrations."—G. Elliot Smith in *Weekly Westminster*.

PROMETHEUS, or Biology and the Advancement of Man. By H. S. JENNINGS, Professor of Zoology, Johns Hopkins University. 2s. 6d. net. A lucid summary of recent advances in biology and their bearings on eugenics and the improvement of the race. This is a new volume in the To-day and To-morrow Series, of which a new prospectus, eight pages, is now ready.

¶ *International Library of Psychology.*

PROBLEMS OF PERSONALITY; A Symposium of Essays which approach the elusive problem of personality from many angles. Important contributions are made by Professors G. ELLIOT SMITH, ED. CLAPARÈDE, PIERRE JANET, WM. MCDOUGALL; Doctors ERNEST JONES, A. A. ROBACK, T. W. MITCHELL, BERNARD HART, C. S. MYERS, WILLIAM BROWN, J. T. MCCURDY, C. G. JUNG, H. H. GODDARD, and many others. 18s. net.

PHYSIQUE AND CHARACTER. By E. KRETSCHMER. With 32 Illustrations. 15s. net.

"We welcome a translation of his notable work. The problem considered is the relation between human form and human nature."—*British Medical Journal*.

COLOUR-BLINDNESS. By MARY COLLINS, Ph.D. Introduction by Dr. JAMES DREVER. 12s. 6d. net.

"Worthy of high praise as a painstaking, honest, well-written endeavour, based upon extensive reading and close original investigation. We believe that the book will commend itself to everyone interested in the subject."—*Times Literary Supplement*.

SEND FOR AUTUMN ANNOUNCEMENTS LIST

KEGAN PAUL

Broadway House, Carter Lane, London, E.C. 4.

JUST PUBLISHED.

A NEW EDITION (3rd).

THE MECHANISM and GRAPHIC REGISTRATION of the HEART BEAT

By SIR THOMAS LEWIS.

Price 50/- net. Postage 1/-.

Specimen pages and abridged list of contents post free

SHAW & SONS, LTD., Medical Publishers, 7, 8 & 9, Fetter Lane, LONDON, E.C. 4.

STAMMERING, SPEECH DEFECTS.

BEHNKE METHOD. Estab. 1882. CASES, non-resident, treated at 39, Earl's Court Square, S.W.5, and, in residence, in the Summer holidays at Miss Behnke's house on the Chilterns.

"Pre-eminent success in the education and treatment of stammering and other speech defects."—*The Times*.

"Thoroughly physiological principles."—*The Lancet*.

"The method is scientifically correct and perfectly effective."
Guy's Hospital Gazette.

"STAMMERING, CLEFT PALATE, SPEECH, LISPING." 3s. 9d. of Miss BEHNKE, 39, Earl's Court Square, S.W.5.

STAMMERING

MOST SUCCESSFULLY TREATED.

RESIDENT AND DAILY PUPILS.

PROSPECTUS AND MEDICAL OPINIONS POST FREE FROM
Mr. A. C. SCHNELLE, [Tel.: Museum 3665
Estd. 1905] **119, Bedford Court Mansions, London, W.C.1.**

STAMMERING

W. J. KETLEY, "Tarrangower," Brondesbury, N.W.6
(Telephone: Willesden 435.)

30 years colleague of late B. BESLEY, Brampton Park, Huntingdon.

Those interested in the subject should write for his book, which will be sent post free.

TRUSS MAKERS.

MATTHEWS BROS., 10, New Oxford Street, London, W.C.1

Established 1840. Telephone: Museum 1017.

PERSONAL ATTENTION GIVEN TO ALL CASES.

DIFFICULT CASES A SPECIALITY

"GAMGEE TISSUE"

Sole Proprietors and Manufacturers:

ROBINSON & SONS, Limited, Chesterfield.

DISPENSING BOTTLES

MEDICAL FLATS, VIALS, POISONS, ETC.

Good Quality, Accurate Measure

at

LOWEST REDUCED PRICES

Prompt attention to Country Orders.

PRICE LIST SENT ON APPLICATION

ESTABLISHED 100 YEARS

I. ISAACS & CO.

NORTH LONDON GLASS BOTTLE COMPANY

London Office: 106, MIDLAND ROAD, N.W. 1.

Warehouse and Stores: London Midland & Scottish Railway Goods Depot, St. Pancras.

Telephone: Museum 4209. *Telegrams:* Isaglasbot, Kincross, London.

The New Jaeger Underwear

A Consulting Physician writes:—

"In my opinion this invention of a Two-layer stockinet weave constitutes a distinct advance. The layers are so ingeniously woven that, for all practical purposes, the material behaves as a single fabric, whilst the air contained within the meshes acts as a bad conductor of heat, renders the garments more hygienic and, at the same time, lighter in weight than their somewhat bulky winter-weight predecessors.

In wear the fabric is warm and comfortable, and the texture is fine enough not to be irritating."

JAEGER *Pure Wool*

TWO-FOLD UNDERWEAR

Please write for Samples and Illustrated Catalogue.

THE JAEGER CO. LTD.
95, Milton Street, London, E.C.2.

Cameron Lectures

Delivered at the University of Edinburgh on Oct. 19th, Oct. 20th, and Oct. 22nd, 1925,

BY HARVEY CUSHING, C.B., F.R.C.S. ENG.,
PROFESSOR OF SURGERY IN HARVARD UNIVERSITY.

LECTURE II.*—THE PITUITARY GLAND AS NOW KNOWN.

> "In those creatures that have the *glandula pituitaria* large, (as in Calves, for instance) the two Carotid Arteries meeting about the *sella* of the wedge-like bone presently divide themselves into small twigs, which being interwoven . . . . make on each side a notable *plexus*, called *Rete mirabile* . . . . So that in these creatures that gland seems to be of the same use to the *Rete mirabile*, as the *glandula pinealis* is to the *plexus choroides*, viz., to separate a serous matter from the Arterial Blood. But in Man, (according to the best Anatomists) this *Rete* is wholly wanting; so that . . . . the *glandula pituitare* is of less use in him, than in other creatures that have the *Rete*."—*Thomas Gibson's "Anatomy" (1688).*

THE subject before us, in view of the time-honoured association of the pituitary body and the cerebro-spinal fluid pathways, is not so far removed from that of the preceding lecture as might be supposed. But there is still so much about the gland that remains unknown we cannot afford to smile at those who once thought that it served as a strainer for the sedimented waste products of the brain which passed out by the infundibulum as pituita or slime into the nose. This Galenic conception, indeed, persisted for 15 centuries, and as late as 1631, in his "Integrum Morborum," Robert Flood explained the ætiology of coryza on the principle of the siphon action between the ventricles and the nose. Could he have known that the hypophysis is present in all vertebrates and that in the low order of amphioxus a canal lined by ciliated epithelium affords a communication between the buccal and cerebral cavities, he would have had something more than tradition with which to substantiate his beliefs.

But Schneider (he of the membrane), in his "Liber de Osse Cribriformi" (1655), denied the existence of any demonstrable communications; nor could either Willis or Richard Lower or Vieussens find any by the experimental methods at their command. And yet how could a spontaneous cerebro-spinal rhinorrhœa, of which these learned men most certainly have had knowledge, have been accounted for on any other basis? Even Magendie leaves one with the impression that the hypophysis may represent a sort of lymph gland interposed in the fluid pathway.

Truth assuredly lies at the bottom of a well; and that out of these gropings in the dark, the pituitary body, in the past decade or two, should have come to occupy a position in medicine out of all proportion to its size is the more remarkable. Of this I need not remind the members of a school whose professor of physiology not only was a pioneer contributor to our knowledge of its functions, but who has inspired many of his pupils to the making of further discoveries. Indeed, if I am not mistaken, it was he who in his admirable Lane Lectures in 1913 actually baptised the "Endocrines" of which we hear so much to-day. . . .

During the first decade of the century great confusion prevailed in regard to the disorders of the gland. To be sure, acromegaly and gigantism were recognised as clinical entities known to be associated with hypophysial tumefactions, but Pechkranz (1899), Fröhlich (1901), Axenfeld (1903), Müller (1905), Brissaud (1907), and probably a good many others, ophthalmologists and gynæcologists in particular, were calling attention to the existence of tumours of the gland or its neighbourhood associated with combinations of optic atrophy, amenorrhœa, infantilism, adiposity, and sometimes diabetes insipidus—in short, a most heterogeneous array of symptoms which had no apparent relation to acromegaly whatsoever.

The attempted reproduction of any of these mysterious syndromes by extirpation methods had been unavailing; and though physiologists had shown the existence of an active substance in the posterior lobe, it was generally believed that the organ must be vestigial, since those pioneers who had undertaken its experimental removal claimed that no symptoms whatsoever ensued. However, because of the gland's inaccessibility and small size these experiments were particularly difficult to carry out, and the results, to say the least, were undependable. Certainly, were hypophysial tumours ever to be operated upon successfully, it was necessary to know something more about the function of the gland if for no other reason than to avoid such mistakes as had been made in the process of developing the operation of thyroidectomy.

Experimental Apituitarism.—In 1907 a Roumanian investigator, Paulesco, devised a new operative approach to the canine hypophysis which enabled him to expose the gland so that it could be successfully and cleanly extirpated. The animals invariably died with a peculiar train of toxic symptoms, and he naturally concluded that the organ was essential to the maintenance of life. Here, then, out of all the vagueness of the past was something tangible, if the astonishing statement was to be believed. Dr. L. L. Reford and I in the same year undertook to repeat Paulesco's experiments and came to the same conclusions. The animals with proven total removals all died with what, in imitation of Kocher's designation for the symptoms provoked by a total thyroidectomy, we termed *cachexia hypophysiopriva*. . . . After all, the important thing to have shown is not whether the gland is actually essential to life, but that, instead of its being merely a vestigial structure of no consequence to the organism, as was claimed by Paulesco's predecessors, it is in reality an organ of extraordinary importance for the maintenance of a normal physiological equilibrium.

One would suppose, with the present-day activities of surgeons in operating upon the gland, that the clinic would by this time have provided corroboratory evidence bearing upon this matter one way or the other, just as the extirpation of the thyroid served to bring to light the essentiality of the parathyroid bodies to the maintenance of life; and though extensive operations for the removal of tumours such as the congenital lesions arising from the relics of Rathke's pouch are occasionally followed by a slow train of symptoms with fatality from inanition, I have never but once known of a clinical case in which the symptoms resembled the experimental cachexia hypophysiopriva which is so quickly fatal in animals.

This case was that of a middle-aged woman who, while in normal health, had a sudden headache which was soon followed by stupor, coma, and death in three days. The abruptness of this unexplained illness led to a detailed medico-legal examination of the body. Nothing whatever was found which could possibly account for the death but a small and unsuspected pituitary adenoma. Into this adenoma a spontaneous hæmorrhage had occurred with complete intracapsular destruction of the gland.

But to return to our laboratory studies. We naturally felt that if the train of symptoms were actually due to the removal of the gland, they could be offset by preliminary or coincidental glandular transplantation; and during the following year (1908–09), with Dr. S. J. Crowe and Dr. John Homans, an attempt was made to answer this and the many other questions which crowded in upon us. . . .

When I re-read to-day our report on the prolongation of life by transplantation of the gland after total hypophysectomy, I am less impressed with our partially successful results than I am with the many sources of confusion which beset us. We were vainly

* Lecture I. appeared in THE LANCET, Oct. 24th, 1925, and Lecture III. will appear in a subsequent issue. They are slightly abridged for issue in our columns, and will be published shortly as a small volume, dedicated to a group of young collaborators.—ED. L.

endeavouring to distinguish between the comparative importance for the maintenance of life of the epithelial *versus* the nervous portion of the gland; and in respect to the latter had been entirely misled in regard to its relation to diuresis by the studies (1901) of Schafer and Magnus—an error which at least put us in very good company. There is, however, perhaps one thing in our report which is deserving of attention to-day—namely, the appearance, in the vicinity of a transplant made into the cerebral cortex, of Herring's hyaline bodies which we regarded as evidence of activity of the posterior lobe. But this concerns a mooted question to which I shall return.

Experimental Hypopituitarism.—These things were of minor significance when compared with a far more important observation made in the course of these experiments—namely, that many animals which survived partial hypophysectomies became in time adipose, inactive, and sexually dystrophic—a train of symptoms, in other words, resembling in many respects the confusing clinical syndromes produced by tumours of the gland which failed to cause acromegalic overgrowth, but on the contrary were accompanied by an adiposo-genital dystrophy. It is a curious fact that we had long been surrounded by these fat and lethargic animals before we really "saw" them, and before the idea burst upon us that we had actually produced states of pituitary insufficiency. . . .

An array of problems was immediately exposed for attack by this disclosure. Could the symptoms, as in the case of thyroid deficiencies, be offset by feeding of extracts or by glandular transplantations? What was the active principle with which we were dealing and where did it reside; in the posterior lobe, which alone possessed an active substance so far as physiologists could tell us, or in the anterior lobe, or in both, or were there several principles? Why should these experimental hypophysectomies have produced so many striking changes in the other ductless glands? What would be the effect on growth, provided the experiments were made on puppies rather than on the adult animals selected at random for our earliest series of experiments? Some of these questions like the last were soon answered; some of them still remain unanswered, for the riddles of physiology are not so easily solved as all that.

A series of hypophysectomies in puppies was soon carried out with Dr. Emil Goetsch, giving results, so far as the retardation of growth is concerned, in entire agreement with those reported by Ascoli and Legnani (1911) and by Aschner (1912), whose admirable papers forestalled us. We, however, doubted the truth of Aschner's contention that the effects he had obtained were due to uncomplicated total removals, in view of the operative approach through the mouth which he had employed; and yet, though we still clung to the view of essentiality of the gland, we had to admit that the fatal cachexia following its total removal in puppies was much less prompt in its onset than in older animals.

But when it occurs, this state of apituitarism, as we had observed it, is unmistakable, characterised as it is by somnolence, a slowed pulse and respiration, and a subnormal body temperature which tends before the end to fall almost as low as that of the surroundings; and Dr. Goetsch observed that the hearts of some of these animals continue to beat after death much as does the heart of a batrachian. We naturally inferred that the loss of the gland leads to some profound disturbance of metabolism and heat regulation. These effects we were inclined to ascribe chiefly to deprivation of the anterior lobe, for in confirmation of Paulesco's observation we had found that the dislodgment of the infundibular lobe (pars nervosa), leaving the pars anterior intact, led to no recognisable disturbances—an observation the more surprising in view of the active principle it was known to contain. We were not then aware, of course, that the infundibular stalk, and even the tuber, contains pathways in connexion with the pars tuberalis resembling those in the body of the lobe, and also that extracts of these areas contain traces of the active principle. Even so, it is quite probable that all of this posterior lobe tissue, pars nervosa and intermedia included, could be spared, and no untoward symptoms supervene provided the anterior lobe remains intact. . . .

Let us first of all turn our attention to this seemingly unimportant posterior lobe, to its secretory product, and the manner of its discharge.

THE PARS POSTERIOR.

As later experiences taught us, we had been barking up the wrong tree in our original conjecture that it was deprivation of the anterior lobe which caused the serious alterations in physiological equilibrium in our extirpation experiments; but leaving this aside, a more important pursuit was that in connexion with the series of animals in which incomplete extirpations had been made, particularly those with stalk division which Paulesco erroneously regarded as equivalent to a total extirpation.

In the quotation used as a caption to this lecture, Gibson makes reference to the *Rete mirabile* of the older anatomists, and Dr. Heuer, Dr. Goetsch, and Dr. Dandy made studies of the circulation of the canine gland which showed that the entire supply to the anterior lobe passed down the infundibular stalk from the Willisian vessels, whereas the posterior lobe had an additional blood-supply from vessels which enter it from behind. We therefore knew that it would be possible, in the dog at least, to divide or to obstruct the pituitary stalk without subsequent necrosis, and this led to a series of experiments the consequences of which may at this juncture be discussed.

Formation and Discharge of Posterior Lobe Secretion.—In the course of their studies here in Edinburgh on the cat's hypophysis, Schafer and Herring had called attention (1908) to the faintly staining hyaline or colloidal masses in the loose tissue spaces of the pars nervosa, and suggested that these masses might represent the secretory product of the lobe. In properly fixed preparations of the canine hypophysis we found likewise that these amorphous masses, which appear to be a product of the epithelial investment of the lobe, are at times abundant, and appear to be streaming through the loose tissue spaces which obviously radiate towards the tip of the infundibulum. This had intrigued our interest from the first, and though these presumably colloidal bodies are very elusive and are easily dissolved out of the specimens, leaving the tissue spaces empty, we nevertheless, in full agreement with Herring, frequently saw the masses in the act of seeming to extrude themselves between the ependymal cells into the ventricles.

This naturally led to an effort to detect an active substance in the fluid, and though we found this a most difficult matter, capable of false interpretations and necessitating innumerable controls, Goetsch and I came to believe that posterior lobe secretion was normally discharged into the cerebral ventricles, and ere long succeeded as we thought in demonstrating its presence in the cerebro-spinal fluid, secured from the hydrocephalic ventricles of clinical cases. Doubts as to the correctness of our conclusions promptly appeared. Edinger (1911), while admitting that the spaces in the pars nervosa appear to lead brainwards, had never seen an injection mass enter the ventricle. Carlson and Martin took exception to our findings (1911), also Houssay (1918), and even in our own laboratory the subsequent studies of Dr. Conrad Jacobson, not published till ten years later, failed to corroborate them. Dr. S. C. Harvey and I returned to the matter again in 1915–16, using the plain muscle-contracting (oxytocic) test for pituitrin without results sufficiently uniform and dependable for publication, and there the matter on our part might have rested.

However, certain more successful studies controlled by the oxytocic test were at the same time being carried out in the Pharmacological Laboratory in Cambridge by Douglas Cow (1915), who showed that

the active substance in the fluid, which is most variable in amount, can be increased by the intravenous injection of certain extractives, particularly of the duodenal mucosa. And since the war, independently of one another, W. E. Dixon in Cambridge (1923) and Carl Trendelenburg in Frankfurt (1924) have taken up the subject anew with results that lend support to our original views.

Like many others (Capelletti, Petit and Gerard, Meek, Dixon and Halliburton, Frazier and Peet, to mention a few of them), we became engaged at one time or another, in the course of our cerebro-spinal fluid studies, in the elusive and uncertain pursuit of substances which might increase the flow of fluid. For reasons associated with the closed-chamber factors of the Monro-Kellie doctrine, experiments of this sort offer unusual difficulties and are prone to misinterpretation. However, we felt that we had avoided the more common sources of error by measuring the fluid production as it came from the ventricles rather than from the arachnoid cisternæ; and in our Cerebro-spinal Fluid Studies No. 8, Weed and I reported (1915) that "pituitrin," presumably from its direct action on the plexus, had a particularly marked effect in producing what we called a "choroidorrhœa." As our conclusions in this respect were not confirmed by Dandy and Blackfan (1913) and were opposed also by Dixon and Halliburton (1916) we may well enough have been misled. This, however, is less important than the confirmation by Prof. Dixon and Prof. Trendelenburg of the underlying assumption that under certain circumstances the cerebro-spinal fluid actually contains demonstrable amounts of posterior-lobe secretion.

There are, however, evidences from another source which support our hypothesis and to which we may for a moment refer. In repeating Paulesco's experiments on stalk separation, we had found on subsequent histological examination that the posterior lobe had become so extraordinarily cellular and so infiltrated with hyaline masses that we naturally came to regard this appearance as an evidence of secretory stasis, although we knew of no comparable process in connexion with any other organ of the body. We had at this time also been given opportunities to study a certain number of hypophyses from clinical cases of hydrocephalus due to tumour or otherwise in which the posterior lobe had shown a similar invasion by cells from its epithelial investment. And since many of these patients, as explained in my monograph on the pituitary disorders, had shown constitutional symptoms such as lethargy, adiposity, subnormal temperature, amenorrhœa, and so on, suggesting a deficiency of pituitary secretion, we were led to believe that under these circumstances also there must be an obstruction to the normal discharge of the secretory product from the pars nervosa.

Not only did we find, in agreement with Herring, that these hyaline bodies were greatly increased in amount after thyroidectomy, but they seemed to be even more abundant after a "near total" extirpation of the pancreas, which merely goes to show how closely the endocrine organs are functionally interrelated. But the experiments, carried out with Emil Goetsch in our 1909–10 series, which gave us the most striking picture, were ones in which a silver-wire "clip" was bloodlessly closed on the hypophysial stalk after exposing the gland by the usual operative method.

During the past year with Dr. Maddock a new series of these "clip" experiments has been conducted for another purpose, to which we shall return; suffice it to say, the histological picture of extreme cellularity of the posterior lobe with increase of hyaline and the production of great masses of colloid in the inter-glandular cleft has been invariably obtained. Certainly this striking appearance can only be interpreted as the result of an obstruction to the discharge of the products of posterior-lobe activity, or at least of products which are in transit through the lobe, for some destination or other.

Histogenesis of the Pars Nervosa.—But we know lamentably little about the actual histogenesis and structure of the neuro-hypophysis. The pineal body, a far less important organ, is much better understood and has an easily demonstrable basis of neuroglia; but there are peculiar difficulties which stand in the way of comparable studies of the pars nervosa. We have recently made an effort with the specific dyes introduced by the School of Ramón y Cajal to determine just what may be the nature of the loose tissue strands which radiate through the lobe towards the infundibulum and between which the hyaline masses accumulate. They are supposed to be neuroglial, but they do not take the specific stains for glia, and certainly the cells have none of the morphological characteristics of the glia cells. Delicate nerve-fibres of uncertain destination may be seen passing down the stalk to become lost for the most part in the upper portion of the lobe. Occasional fibrillæ which take the specific glia stains are also demonstrable in the stalk running for the most part crosswise to the course of the nerve-fibres; but neither glia nor nerve-cells can be demonstrated by methods at present at our command in the body of the lobe itself. . . .

Meanwhile, certain experimental zoologists in Germany, England, and America have hit upon a most significant consequence of posterior-lobe extirpation in the amphibia. They have shown that the lobe provides a substance which controls the pigmentary responses in the skin, for after the removal of the anlage of the epithelial portion of the hypophysis from the embryo frog, for example, the tadpole not only becomes retarded in its growth, but remains pale or albinoid owing to contraction of its cutaneous pigment cells (B. M. Allen and P. E. Smith (1916)). These pale animals serve as a most delicate indicator for posterior-lobe (pars intermedia?) secretion, for on its injection in minute amounts the melanophores expand and the animal acquires the normal colour.

This melanophore reaction to posterior-lobe extracts has not as yet, so far as I am aware, been utilised as a test for the presence of this substance in the cerebro-spinal fluid. But whatever future studies may bring forth in this respect, it may suffice to say that the posterior lobe is a unique organ surrounded by an investment of indolent-appearing epithelial cells, seemingly under the direct control of non-medullated nerve-fibres, and that stimuli of one sort or another cause these cells to divide and bud off directly into the loose tissue reticulum wherein they appear to undergo some sort of amorphous transformation as they progress towards the stalk and the infundibular cavity. At this point they not only have the appearance of passing between the ependymal cells into the ventricle, but when this apparent outlet is experimentally occluded, the gland becomes packed with the transforming cells and their secretory products. . . .

Carbohydrate Tolerance.—But I must return again to our second series of hypophysectomies to pick up the threads of another pursuit conducted with Dr. Goetsch and Dr. Jacobson, which led us to investigate the carbohydrate tolerance of our experimental animals, and from this into studies of their basal metabolic rate, which in turn was indirectly responsible for the introduction of the calorimeter into the clinic.

As already stated, we had observed, in connexion with our first series of experiments (1908–09), that definite histological changes occurred in many of the other ductless glands, notably in the thyroid and gonads, as a consequence of the hypophysectomy; and vice versa, as was well known, that changes in the hypophysis occurred subsequent to thyroidectomy, castration, and so on. We naturally wondered whether the syndrome which we had ascribed to a state of hypopituitarism might not be due to these secondary changes rather than to the primary hypophysial lesion.

All this was part and parcel of a developing conception of the inter-relations of the ductless glands, so convincingly presented ere long by the work of

Eppinger, Falta, and Rudinger. We had observed, for example, that a nearly total pancreatectomy appeared to activate posterior-lobe secretion if the associated increase in the hyaline bodies of the lobe could be so interpreted; and we also found that our adipose and lethargic animals with a pituitary deficiency seemed to tolerate the loss of the major portion of the pancreas better than normal animals would have done. We had learned also that the manipulation of the hypophysis sometimes caused a transient hyperglycæmia with glycosuria; that, corroborating Borchardt (1908), the injection of pituitrin, particularly in rabbits, had a similar effect; and, of course, we were aware that acromegaly which we had come to ascribe to a state of glandular overactivity was sometimes accompanied by symptoms resembling diabetes mellitus.

But when in a series of carefully controlled experiments we came to investigate the sugar tolerance of our partially hypophysectomised animals, we were surprised to find that the temporarily lowered assimilation limit for carbohydrates ultimately became raised, and that this increased tolerance for the ingestion of sugar could only be overcome by the coincidental administration of either pituitary or thyroid extract. Since extracts of the anterior lobe had no influence in these reactions, we accordingly were led to explain the symptoms of pituitary deficiency—the adiposity, subnormal body temperature, and so on—to an impaired oxidising or metabolising capacity of the body from loss of posterior-lobe extract, with resultant transformation and storage of sugar as fat. A definite parallelism with these experiments was found to exist in clinical cases of hypopituitarism, though under these circumstances, of course, the precise extent and nature of the functional damage could only be surmised.

As was stated in our first paper (1911) on the subject:

> "If loss or diminution of the internal secretion of the pancreas robs the tissues of their power of metabolising carbohydrates, certainly loss or diminution of the secretion of the hypophysial posterior lobe greatly enhances their power in this respect."

And this naturally led us to conjecture that an injection of the active principle of the pancreatic islets would lower the amount of sugar in the blood and that the active principle of the posterior lobe would raise it—in other words, that the two substances counteract one another, which proves to be true.

Our observations in these matters led us to a reconsideration of the so-called encephalic glycosurias which naturally date from Claude Bernard. Though his celebrated sugar piqûre was well established as a physiological experiment, it had come to be appreciated in the clinic that lesions, traumatic or neoplastic, in the neighbourhood of the hypophysis were more likely to provoke glycosuria than similar lesions near the fourth ventricle, and as early as 1898 M. Loeb had postulated the existence of a sugar centre in the tuber cinereum.

We naturally turned to investigate the manner of discharge and of action of the posterior-lobe secretion in producing hyperglycæmia. In a study of the hypophysial nerve-supply by Ehrlich's intra-vital methods, W. E. Dandy had shown (1913) that sympathetic fibres radiate along with the numerous branches from the Willisian vessels towards the pituitary stalk, and we assumed, from what was known of the nervous control of the adrenal, that the glycosuric effects of these anterior piqûres might be due to a stimulation of the autonomic fibres to the gland. We accordingly undertook to determine the pathways of these impulses, and in an elaborate study conducted in the Laboratory of Surgical Research at Harvard, with L. H. Weed and Conrad Jacobson, it was found, when what we termed "available glycogen" is present in the body, that:

1. A piqûre of the hypophysis in the rabbit is comparable, in its glycosuric response, to a piqûre of Bernard's so-called sugar centre in the fourth ventricle.

2. Stimulation of the superior cervical ganglion, by faradisation or even by the manipulations necessary for its exposure, causes glycosuria in the rabbit, cat, and dog.

3. Stimulation of the superior cervical ganglion after exclusion of all possible downward impulses to the abdominal viscera by way of the vagi, cervical sympathetic trunks, or spinal cord, leads to glycosuria.

4. Stimulation of the superior cervical ganglion after separation of all synapses of the sympathetic system by administration of nicotine causes glycosuria.

5. Direct faradic stimulation of the hypophysis itself, after exposure to a transphenoidal operation, gives glycosuria even after preliminary transsection of the spinal cord and cervical sympathetic trunk.

6. If the posterior lobe of the hypophysis has previously been removed by operation the usual stimulation of the superior cervical ganglion fails to give glycosuria.

7. Direct faradic stimulation of the hypophysis provokes glycosuria even after transsection of the spinal cord above the splanchnics.

8. A classical Bernard piqûre will likewise cause glycosuria even after transsection of the spinal cord above the splanchnics.

We naturally concluded that the infundibular lobe acts under the influence of impulses which pass from Bernard's centre in the brain-stem and reach the gland by way of the cervical sympathetic, there to liberate a chemical messenger which causes glycogenolysis, hyperglycæmia, and glycosuria; and in view of what has gone before, we assumed that this hormone was discharged into the cerebro-spinal fluid pathway.

But with all this, should these findings come to be substantiated (and so far as I know they have never been repeated) they merely throw some further light on the physiology of the posterior lobe and leave us as far as ever from an answer to the pertinent question as to whether the glycosuria of acromegaly is hypophysial or pancreatic in origin.

In an attempt to answer this question Mr. Dott applied himself a year ago, while attached to the Brigham Clinic, without coming to any definite conclusions. We know that acromegalic glycosuria is associated with a hyperglycæmia, and that it reacts to insulin as does pancreatic diabetes. We also know that an acromegalic may die from diabetic coma and no histopathological changes be apparent in the islets, though this does not necessarily imply that they may not be seriously deranged from a functional standpoint. On the other hand, as was first pointed out by J. H. Burn,[1] pituitrin will counteract the effect of insulin, an observation our early studies would fully confirm; and latterly R. C. Moehlig and H. B. Ainslee[2] have shown that the hypoglycæmic convulsions in rabbits produced by insulin may be checked by posterior-lobe extract, which causes a rise in the blood-sugar. Moreover, we know that acromegalic diabetes is capable of spontaneous recovery. . . .

Before leaving this general discussion of the posterior lobe and its manifold activities, there is still another subject which deserves discussion, for it has led to discordant views. It concerns the much-mooted question of the hypophysial polyurias.

Diabetes Insipidus.—Is this disorder primarily neurogenic or primarily hypophysial in origin? This question has divided students of the subject into two opposing camps. Indeed, as may be recalled, a similar discussion once raged in regard to Graves's disease which some still attribute to a neurogenic disorder in which the thyroid plays merely a secondary rôle.[3]

[1] Journal of Physiology, June, 1923, lvii., 318.
[2] Jour. Amer. Med. Assoc., May, 1925, lxxxiv., 1398.
[3] In this connexion should be recalled Cannon's ingenious experiments on cats in which the phrenic nerve and the cervical sympathetic were anastomosed low on one side of the neck. By this procedure the rhythmic efferent impulses associated with respiration passed along the sympathetic, presumably to the thyroid, and provoked a most curious state with excitability, rapid pulse, increased metabolism, and so on, which was interpreted as an evidence of experimental hyperthyroidism. Dr. Gilbert Horrax in 1914, at my suggestion, repeated these experiments, and, as a control, removed the thyroid lobe on the side of the anastomosis. His results (unpublished) were the same as those obtained by Cannon. We naturally claimed that our friend the hypophysis was more concerned than Cannon's friend the thyroid. There the matter rests.

It must have occurred coincidently to many of those who were interested in the subject of diabetes insipidus that the supposed renal sources of the disease would have to be abandoned. For our own part, the early experimental hypophysectomies, with their resultant polyuria, had led us definitely to associate this symptom with a functional derangement of the gland, and this view was supported by certain clinical observations in which patients with bitemporal hemianopsia and primary optic atrophy, unmistakably due to tumour in the region of the hypophysis, had at the same time persistent polyuria of high degree. We have seen that non-myelinated nerve-fibres pass down the infundibular stalk, and it is perhaps natural that the hypothalamus (tuber cinereum) whence they may originate should be a favourite place for the predication of centres such as the sugar centre of Loeb, of which we have already made mention. Erdheim, I believe, was among the first to suggest that an injury of these centres was responsible for these polyurias, rather than that they were due to an actual pituitary derangement; in other words, that they were of nervous rather than glandular origin. He had arrived at this conclusion, I assume, during the course of his well-known studies of the congenital cysts of the infundibular region rather than from the actual identification of any centres by physiological experiments. However this may be, the view doubtless influenced other Viennese investigators, among them Aschner, who explained the polyurias following his experimental hypophysectomies on the same basis, just as did Narbut the diminished oxygen consumption shown by these same animals. . . .

Personally, I find myself in discord with these views both on experimental and clinical grounds; on a pure neurogenic basis it is difficult to explain why the supposedly hypothalamic polyuria should be promptly checked by the administration of posterior-lobe extract. After all, it is perhaps an academic question whether an injury to adjacent nerve-centres whose very proximity is enough to suggest that they preside over the activities of the gland, or whether damage of the gland itself by injury or disease is the actual cause of a given syndrome.

But the whole subject of the non-diabetic polyurias has from the first been in a tangle of inconsistencies, and indeed it was not until 1912 that studies such as those by E. Frank in Minowski's laboratory served to point strongly towards their hypophysial rather than renal origin. The chief source of confusion lay in the fact that diuresis provoked by posterior-lobe extracts is but a transient effect, and it was not until the acute physiological experiments on which this opinion was based were checked by long-enduring observations that the extract was found to have precisely the reverse effect—namely, to provoke an oliguria rather than a polyuria. The experiments of Ketil Motzfeldt carried out in the Harvard Laboratory (1917) were among the first to make clear that pituitrin actually has antidiuretic properties, and thus to explain the apparent disharmony of the physiologists and clinicians; for it had been clinically observed by both Farini and Von den Velden (1913) that the extract given hypodermically, contrary to expectation, would actually inhibit the polyuria of diabetes insipidus.

This was a disclosure which justifies all the time and thought which many have given to the subject of these polyurias, for it has put into our hands what Andrew Cameron was after—namely, a practical therapeutic treatment for the amelioration of a most distressing disease. Still, we are no nearer an actual explanation of diabetes insipidus, for if the disorder is due to an injury of some centre in the tuber cinereum, it is remarkable that it is so rarely an accompaniment of the craniopharyngeal-pouch tumours which compress and deform not only the tuber where the centres supposedly lie but the hypophysis itself.

It was for the purpose of reconsidering the interpretations which Bailey and Bremer had put upon their experiments, and in the hope of reconciling our conflicting views on the subject, that Dr. Maddock and I this past winter have made a control series of experiments in which, as stated, we have reverted to the method employed in our earlier studies of placing a silver "clip" on the hypophysial stalk. By the aid of Weed's brain-shrinking method these operations are conducted more easily to-day than they formerly were, and the "clip" can be closed on the stalk of the dangling canine gland quite bloodlessly and without any appreciable or histologically demonstrable injury of any adjacent structures. When this procedure is carried out, precisely the same train of symptoms is evoked that Bailey and Bremer describe—viz., a prolonged polyuria with subsequent tendency to adiposity.

Probably, therefore, the effects are the same whether produced by: (1) an injury to the hypothalamic centres; (2) a "block" of the nervous impulses with obstruction of the secretory products in the posterior lobe; or (3) a partial hypophysectomy with actual removal of the lobe. In other words, a break in the mechanism of posterior-lobe secretion from nerve-centre to gland produced by any agency tends to upset the normal water balance and to cause an hypophysial polyuria; and, conversely, the administration of pituitrin serves to check the experimental polyuria thus produced wherever the break in the mechanism may have occurred.

This explanation at least harmonises the differences which lay between my own preconception in this matter and the views of my pupils. But it will not, I fear, quite satisfy those who, like J. J. Abel, if I understand him correctly, believe that the responses are entirely by chemical messengers and that the direct nervous influences may be wholly disregarded.

The antidiuretic property we have been discussing is but one of many which extracts of the posterior lobe possess, and some of which are already utilised for practical therapeutic purposes. The attention of the pharmacologist has tardily become focused on a study of the biochemical nature of the substance or substances responsible for these various reactions. Some have postulated the existence of three or four separate hormones. Others, like Prof. Abel, believe that there is only one specific hormone which alone, as appears to be the case with his tartrate, is capable of evoking all the known responses, cardiovascular, antidiuretic, oxytocic, respiratory, and melanophore-expanding.

THE PARS ANTERIOR.

In what has gone before overmuch has perhaps been said in regard to the physiology of the pars nervosa, and we may now turn to the epithelial lobe, where there are fewer functional straws at which to grasp, though there are many reasons for ascribing to this portion of the gland the premier rôle among the endocrines—if, with all said and done, we are entitled to consider separately the function of the two or three anatomical subdivisions of the gland. However this may be, the customary physiological weapons of attack are unavailing in the case of the pars anterior and we must have recourse to roundabout ways if we would spy into its secrets. The fact that we are not all in agreement as to whether the various cellular elements, chromophile and chromophobe, comprising this highly vascularised lobe represent different stages of activity of a single cell type or are cells of quite different function, shows the present great limitations of our knowledge. As Abel has said in regard to the posterior lobe hormone, there are Unitarians and Trinitarians among us.

Metabolism Observations.—In considering the relation of the posterior lobe to the utilisation of sugars, the question was discussed whether the glycosuria of pituitary disease should properly be regarded as an hypophysial or a pancreatic effect. A similar question is naturally raised in regard to the alterations which the clinical cases show in their metabolic rate. Are they primarily hypophysial or secondarily thyroid in origin? To this subject we may now turn for a moment.

While we were engaged in our studies of carbohydrate tolerance in 1908–10, I knew nothing about metabolism estimations, hardly knew, indeed, what the term with its modern implications signified. We had observed in the clinic that outspoken states of hypopituitarism, in addition to the adiposity and sexual dystrophy which they showed, were accompanied by periods of profound and long-enduring somnolence, by a slowed pulse and respiration, by a subnormal body temperature, and by an apparent insensitivity to external stimuli—states comparable to those of our experimentally hypophysectomised animals. Certainly these individuals were burning their tissues at a low fire, and it was perhaps not unnatural that the clinical syndrome should have suggested resemblances to what we vaguely knew as the state of hibernation. Since the experimental extirpation of no other ductless gland except the hypophysis, so far as we knew, caused this particular train of symptoms, Dr. Goetsch and I were led to make some studies in this direction, and we found, as others had found before us, that in the hibernating state the ductless glands, notably the hypophysis and gonads, appear to be in a resting stage, whereas at the period of awakening they become markedly hypertrophied; but aside from these simple histological studies which served to disclose these facts, we found ourselves dealing with a subject of unanticipated difficulties which was intertwined with chemico-metabolic problems beyond our reach.

A more important lead came from another direction, for Dr. John Homans, after his year in the Hunterian Laboratory, enlisted the interest of Francis Benedict in the subject of our dyspituitary dogs, whereupon Dr. Benedict devised a respiration calorimeter for determining the carbon-dioxide production of small animals. With the aid of this apparatus, as described in their detailed report (1912) from the Carnegie Nutrition Laboratory, they observed, among the other general effects of a partial hypophysectomy in puppies heretofore discussed, that in the course of time there was a marked post-operative fall of the total metabolism as measured by the carbon-dioxide production per kg. of body-weight per hour, a fall which was the more striking owing to the amount of inert body fat the animals gradually acquired. . . .

It may suffice to say after this lapse of a dozen years that the hypopituitary cases show, as did Homans's animals, a lowered rate, whereas the metabolism in the active stages of acromegaly is raised, though never to so high a percentage as may be seen in hyperthyroidism. The extremes which have been observed are −39 for the former and +65 for the latter.

But this does not answer the question at hand—Is the increased rate in acromegaly due to a secondary thyroid hyperplasia rather than to some influence on metabolism possessed by the hypophysis itself? We, of course, are all aware that acromegaly has notable polyglandular manifestations, and I believe the view is held in the Mayo Clinic, where Dr. Boothby and Miss Sandiford have gone, that the increased metabolic rate shown by these cases is a secondary phenomenon; for it has been observed that removal of the enlarged thyroid of an acromegalic lowers the rate. But even this does not settle the point. The only proof could come from a lowering of metabolism by the partial removal of an hypophysial adenoma leaving the enlarged thyroid untouched; and an example of such an effect has been cited in a recent study of the pituitary adenomas by Dr. Bailey and Mr. Dott. . . .

Hypophysial Relation to the Glands of Sex.—Among the most definite consequences of hypopituitarism, whether produced by experimental procedures, by glandular tumours, even by hydrocephalus, so frequent a source of interference with the gland's activity, are the secondary effects on the gonads to which attention has often been called. Infants fail to acquire normal sexual adolescence; adults lose their sexual desires and potency; amenorrhœa in women is one of the first tell-tales of disturbed function.

It is difficult to tell whether these symptoms and the histological changes which accompany them are ascribable to the anterior or posterior lobe or to the combined action of both, but reversible effects show at least that the anterior lobe is an important element. Erdheim and Stumme, for example, first clearly showed (1909) the remarkable alteration in the cells of the anterior lobe associated with the amenorrhœa of pregnancy. The secondary enlargement of the hypophysis in eunuchs had been noted before this by Fischera (1905) and by Tandler and Gross (1905); and it is stated that in castrated hens the gland almost doubles in size. Indeed, the hen's plumage acquires male characteristics just as in certain clinical endocrine disorders we may see a suggestive reversion of the female to the male type and vice versa. All told, modern experiments on the gonads and sex physiology read like a story from the Arabian Nights.

Naturally, while we have been waiting for the biochemist to isolate the active principle or principles of the gland, efforts have been made both in man and animals to see what would be the effect of prolonged feeding of pituitary substance and of glandular transplantations. The attempts have been innumerable, and the results, so far as growth is concerned, quite negative, though Prof. Schafer was led to believe that "the addition of a small amount of pituitary substance to the food appears to favour the growth of young animals." . . .

In 1913–14 Dr. Goetsch took this matter up anew. In a time-consuming and most carefully controlled study of a series of young rats of known pedigree and growth curve he found that the daily oral administration of bovine anterior lobe extract during the preadolescent period had a remarkably stimulating effect upon the development of the reproductive glands of both sexes, shown not only by their early sexual maturity and their precocity in raising families, but by demonstrable histological evidences of precocious ovulation and spermatogenesis. . . .

The Hypophysis and Growth.—The experimental zoologists have turned their attention to the relation of the pars anterior to growth, and P. E. Smith (1917) showed that the retarded development of hypophysectomised tadpoles could be accelerated if they were fed upon certain residues of the anterior lobe. But the most convincing experiments yet conducted have been those of Herbert M. Evans (1922–5). Dubious of the effects to be expected from the oral administration of pituitary extracts in the higher animals, Evans gave to a series of rats daily intraperitoneal injections of the emulsion of fresh bovine gland, and succeeded in producing such marked overgrowth as to justify him in designating the condition as one of actual gigantism. Thus the assumption that the overgrowth of clinical acromegaly and gigantism is an expression of hyperpituitarism receives its first really striking experimental proof. . . .

Encouraged, as others doubtless have been, by Dr. Evans's remarkable results, we have undertaken on our own account some further studies in regard to growth. Dr. Leo Davidoff, who has for the past two years been concentrating his attention on our series of acromegalics, undertook to see, by using Evans's methods, whether in animals, which had presumably attained their full stature, acromegalic characteristics might not be observed. But this proves to be a most difficult quest; and since preparations such as Evans employed are not tolerated by larger animals such as rabbits, cats, and dogs, when given intraperitoneally, we cast about to find some standard pharmaceutical preparation which at least might appear to possess traces of an active anterior lobe principle.

One of these preparations was found to have a prompt effect in checking the œstral cycle in female rats, and though this in the light of Goetsch's experiments would seem contradictory, it at least showed the presence of an active substance of some sort. Accordingly, a series of rats was subjected to prolonged intraperitoneal injections with results which suggested, at least, that the preparation contains the

growth principle as well. The experiments, indeed, taken in conjunction with P. E. Smith's experiences on hypophysectomised tadpoles, were regarded as sufficiently encouraging to justify an attempt in the clinic to stimulate growth in one of our little patients whose stature for the two years following a successful removal of a Rathke's pouch cyst had remained unchanged.

These children are peculiarly cooperative and intelligent patients, and this particular child submitted, with his parents' consent, to receiving an intraperitoneal injection of 5 c.cm. of this substance every second day for a period of over two months. We had hoped that the effect of the substance, were it actually present, would be more marked in a case of pituitary infantilism than in a normally developing individual; but no effect whatsoever was observed. We evidently have much more to learn about these extracts before we can adopt them to clinical use, and the many apparent contradictions had far better first be untangled, so far as possible, in the laboratory where observations can be controlled. . . .

SURGICAL CONSIDERATIONS.

The Tumours.—As emphasised in many places, had it not been for the tumour and its local pressure effects the surgeon would hardly have come to meddle with the questions which up to this point have been under consideration. Having been drawn in, because there were mechanical difficulties to overcome, it was inevitable that he should take something more than a mechanical interest in the subject. So it was with the thyroid. Certain goitres by displacing and flattening the trachea caused a mechanical dyspnœa which could only be relieved by some surgical procedure. Kocher and the Reverdins first had the temerity to undertake operations under these desperate circumstances, and it is common knowledge that clues for solving some of the thyroid and parathyroid puzzles were thereby supplied.

But the thyroid goitre offered a simple problem compared to that of the hypophysial goitre. One was exposed to view for the layman to diagnose; the other was concealed and affected not only the eyes of its victim, but obscured the vision of the professional observer as well. Consequently those who now have on their hands the responsibility of tardily developing the operative treatment of hypophysial disorders may comfort themselves by the recollection that those who have relayed to their successors the surgery of the thyroid adenoma had a 20-year head start, and our problem is a far more complicated and difficult one. We meanwhile have profited greatly by their experiences; have more or less followed in their footsteps and avoided some of the pitfalls they had pointed out.

I have already touched on the fact that one or two of the earliest operations on the hypophysis were in cases of acromegaly, and that those who had undertaken them were led to believe that there had been a definite amelioration of the constitutional as well as of the local symptoms. But these were precocious steps taken in imitation of partial thyroidectomy for Graves's disease, and as we now understand the matter they were steps taken out of turn. For even to-day one may as well admit that the treatment of pituitary tumours consists of little more than the prevention or relief of the local pressure-effects of pituitary or parapituitary tumours. True, this is a great boon, and the neuro-surgeon now shares with ophthalmic surgeons the thrills and satisfactions of restoring vision to persons on the verge of blindness.

But in his desire to share in this satisfaction, the surgeon may get into infinite trouble unless he has some knowledge of just what he is after. I recall the remark made by a companion while watching a small dog bounding across the fields in pursuit of a railroad train: "I wonder what he'll do with it when he catches it." So it behoves us to be thoroughly aware of the nature of the various tumours of the hypophysial neighbourhood, and there are perhaps three main groups: the suprasellar meningiomas and craniopharyngeal pouch tumours which, in addition to their local pressure effects, may evoke typical hypopituitary syndromes, and, thirdly, the hypophysial adenomas proper, some of which give the reverse clinical picture. Without a definite understanding of the precise situation, behaviour, and manner of growth of these several lesions, it would be foolhardy to attack them; and the surgeon consequently must know his morbid anatomy no less well than his physiology of the gland.

We, of course, are indebted to the pathologist for our primary conception of these several lesions, but by the time they have come under his observation it is inconceivable that they could ever have had any surgical bearings. The fairly common suprasellar meningioma, which takes its origin from the arachnoidal cell-nests as described in the preceding lecture, may slowly in the course of years attain the size of a fist before it causes death; and yet these lesions when small are not only capable of being diagnosed, but can be exposed and totally removed with preservation of vision in spite of their awkward position between hypophysis and chiasm.

The Congenital Cysts.—And the same is true of the more common craniopharyngeal pouch cysts first clearly described by Erdheim in 1904, though there is very little in the literature concerning the surgical treatment for these remarkable congenital lesions. They usually, though not invariably, begin to manifest their presence in preadolescent life both by local signs of tumour as well as by their pressure-effects on the hypophysis as a whole. Hence in these little patients one may see in most outspoken form the combined syndrome of anterior-lobe disturbance (sexual and skeletal infantilism) and of posterior-lobe disturbance (adiposity, a high sugar tolerance, a low metabolism and sometimes diabetes insipidus).

These lesions, moreover, are usually suprasellar and need not in any way deform the sellar outlines as shown by the X ray. But there is a tell-tale of their presence which to-day is demonstrable in fully 80 per cent. of the cases owing to the refinements of roentgenological technique which the invention of the Potter-Bucky diaphragm has made possible. This concerns the deposits of lime salts which occur in connexion with the keratinised epithelial lining of the cysts. The diagnosis, however, is not quite so easy as all this, for sometimes the congenital tumour does not ride so high, but may actually develop within the capsule and distend the sella precisely as does the more common adenoma. . . .

With the congenital cysts, however, the difficulty is not so much in the diagnosis as in knowing how to deal with the cyst when it is exposed. The mere evacuation of its contents gives only temporary relief since there is an early refilling. Extirpation is necessary, and this is difficult because of the relation of the tumour to the optic nerves. These cases, of course, are operated upon from above by an osteoplastic approach; different surgeons advocate different procedures, but personally I prefer to come down upon the lesion from in front rather than from the side.

Though I do not intend to bore you with descriptions of operations, it may be said that the chiasm, in justification of its name, represents the crux of the matter. Though some of the cysts have sufficiently thin and tough walls so that after evacuation they may be drawn out from between the distorted optic nerves practically intact, more often the calcareous and keratinised part of the wall is so adherent and extensive as to make this impossible. I have never quite had the courage to take what may be the proper step under these circumstances—namely, to split the chiasm fore and aft, thereby committing the patient to a permanent bitemporal hemianopsia, but at the same time giving free access to the mesially placed tumour which at times may assume astonishing proportions. We have seen such a cyst as large as a tennis ball, its walls a solid mass of calcification.

After all, a permanent bitemporal hemianopsia is preferable to the recurrence of symptoms so apt to take place. Only one anatomical structure stands in the way of such an operation—the anterior communicating artery which lies stretched out across the elevated surface of the chiasm, but this vessel, as I have found, can be easily "clipped" and divided. Thomas Willis would be interested to know that a portion of his circle, from which the spokes of the *Rete mirabile* of his predecessors pass to the hypophysis has actually come, after all these years, to be an important factor in a surgical operation.

The Adenomas.—These present quite a different surgical problem from the congenital cysts, and, strictly speaking, should be the main object of our discourse, for they are by far the more common lesion, and primarily rather than secondarily affect pituitary function. They have so recently been made the subject of a detailed report by Mr. Dott and Dr. Bailey that it is hardly necessary to say more. Dr. Bailey has come to believe from a histopathological review of the adenomatous tissues in our collection that he can identify a "mixed type" of adenoma. This differs from the chromophile adenoma of acromegaly and the chromophobe adenoma characterising hypopituitarism, in that a peripheral rim of eosinophilic granules still persists about the cell; and he and Mr. Dott feel confident that this particular type of adenoma serves to explain those mixed clinical syndromes in which traces of acromegaly are seen commingled with the clinical evidences of hypopituitarism.

It is our custom and preference to approach these glandular tumours by a method called transsphenoidal. A small incision is made under the lip; the mucous membrane is separated on each side so that the operative approach is by way of the nose but does not actually enter the nasal cavities. A speculum is inserted, the anterior wall of the sphenoidal cells removed, the thin bulging floor of the sella chipped away, the dural encasement incised, and such an amount of the gland as is thought sufficient to relieve pressure is then spooned or sucked away. It sounds simple, and in a favourable case may be so. What is more, the convalescence is usually rapid and uneventful with rapidly widening fields of vision.

One would suppose that these operations, which necessarily open the enveloping arachnoidea of the gland, would be attended by great risk of meningitis. As a matter of fact they are not, and the mortality of the series taken as a whole, including the early operations, which were foolishly done on patients often in extremis due to a then poorly understood intracranial extension of the growth, is now approximately 7 per cent.[4] However, in the last 50 successive transphenoidal operations there has been only one fatality, which brings the operative mortality of the more recent years well within bounds—namely, at 2 per cent. But what is of more importance is the fact that in about 70 per cent. of all these cases there has been a vast improvement of vision. This, of course, is the proof of the pudding.

In the days when we first began to study these cases in the surgical wards at the Johns Hopkins, the perimeter was a dusty instrument on a shelf rarely used except for demonstration either in the neurological or ophthalmological clinics. To-day we could not get on without it, and the perfected technique of taking the field peripheries which was elaborated by Clifford Walker during the years he was a member of my staff continues to be employed, so far as they are capable of it, by my successive neurosurgical residents. And a neurosurgical group has scarcely less need of the ophthalmoscope and the calorimeter and other instruments of precision. Nor should the microscope be forgotten, for the histopathology of these lesions is no less important to him for diagnosis and prognosis. Subdivisions of responsibility in the routine handling of large groups of patients is probably necessary—diagnostic tests by a series of special people, an operation by another set, the pathological report by still another. But any such system, when progress is to be made in a new field, is unworkable.

I was once told by Prof. Kocher, who I suppose had his experiences with the thyroid in mind, that no satisfactions in medicine were so great as those which came from concentration upon and the mastery of a small subject, and that this necessitated an approach from all aspects, diagnostic, experimental, pathological, and therapeutic, not the least important part of which at one time or another in the history of the subject was likely to be surgical.

It will be given to few to play such an important part in the history of any subject as that which he played in the case of the thyroid disorders. The best that people of lesser intellects and industry than he possessed can do is to come as near to this goal as their abilities permit. But the surgery of the hypophysis at the present time, as I am sure he felt about the surgery of the thyroid in his early days, is practically in the "stone age" of its development. The time will come, ere long perhaps, when the biochemist will have shown us how to cure most of the common functional adenomas of both of these glands without surgery. Prevention will then come in its turn to supplant even these eagerly sought medicinal cures, and this will represent the "golden age" of the subject which not even the youngest of us here are likely to see.

[4] Out of 219 cases of pituitary adenoma, 214 have been operated upon. The transphenoidal route has been used in 203 cases with 15 fatalities, giving a mortality of 7·38 per cent. The transfrontal route has been used in 35 cases with two fatalities, giving a mortality of 5·7 per cent. The total operative mortality for the entire series is therefore 7·1 per cent.

Remarks

ON THE

PHYSIOLOGY OF MUSCULAR ACTION.

Presidential Address given before the Section of Orthopædics, Royal Society of Medicine,

BY A. S. BLUNDELL BANKART, M.CH. CAMB., F.R.C.S. ENG.,

ORTHOPÆDIC SURGEON, MIDDLESEX HOSPITAL; SURGEON, ROYAL NATIONAL ORTHOPÆDIC HOSPITAL AND HOSPITAL FOR EPILEPSY AND PARALYSIS, MAIDA VALE.

IT is not long since a well-known surgeon said that surgery was anatomy, pathology, and common sense, while, as for orthopædic surgery, it was nothing but anatomy and common sense. This is a common misconception of orthopædic surgery as a sort of mechanical craft, although the proceedings of this Section alone would convince anyone of the wealth of pathological material with which we have to deal. But orthopædic surgery is more than that. The ultimate aim of orthopædic treatment is *restoration of function*, and those who profess to deal with disorders of bodily function must have some knowledge of the normal functions of the body, that is physiology.

Ten years ago Sherrington remarked that "the publications of zoologists and clinicians do not commonly meet quickly." It is rather humiliating to discover that some cherished belief, some generally accepted theory, and perhaps the treatment based upon it, is about 20 years behind the known facts of physiology. So I thought that I might use this occasion to direct your attention to some bearings of physiology on orthopædic surgery rather with a view to stimulating thought and discussion than with any idea of presenting new facts. And, as so much of our work is concerned with the action of muscles, and time is short, I will confine my remarks to this important part of the subject—the activities of muscle.

Some years ago I drew attention to the significance of Sherrington's work on the postural activity of

muscle—work which has not only thrown new light on the nature of posture and the disorders of posture, but has compelled us to revise entirely our ideas concerning the action of muscles generally.

TWO KINDS OF MUSCULAR ACTIVITY.

It is now known that the skeletal muscles exhibit two kinds of activity. The one is phasic—quick and transient and concerned with the execution of movement; the other is tonic—relatively slow and prolonged and concerned with the maintenance of posture. These two kinds of muscular activity are physiologically quite distinct. They differ in their effects, in their metabolism, in their nervous mechanisms, and recently it has been said that they are anatomically separate. But of this I shall have more to say presently.

Muscle is a specialised substance which has the property of altering its shape in response to a nervous impulse. This alteration in shape, which gives rise to movement, is due to a change of surface tension brought about by electro-chemical means upon the surface of the muscle-fibres. It should be noted that a muscle-fibre undergoes no change in volume; it merely becomes more spherical or less spherical, as the case may be. Both contraction and relaxation of muscle are thus active processes. The change is accompanied by a great expenditure of chemical energy, by the production of heat, and by the consumption of oxygen and output of CO_2. If unduly prolonged or frequently repeated, this kind of activity becomes rapidly fatigued, and the muscle becomes incapable of further action until it has rested.

Except that smooth or unstriated muscle has a certain power of automatic action, the only natural stimulus of muscle is a nervous impulse. The response to a single nervous impulse is a single twitch. Voluntary contraction is a tetanus—that is, a summation of twitches brought about by a rapid succession of impulses down the nerve-fibre at the rate of about 50 per second.

It was shown by Keith Lucas that the propagated disturbance in a nerve-fibre is always of the same intensity, regardless of the strength of the stimulus. It follows, therefore, that the nervous impulses which reach muscle-fibres are always of the same strength. It is now known, too, that muscle contracts on the "all or none" principle—that is, if it contracts at all it contracts for all it is worth. This used to be thought to be a peculiarity of heart muscle, but it is now known to be true of all muscle.

There are, therefore, no degrees of contraction in normal muscle-fibres; there is no such thing as a strong contraction or a weak contraction, apart from the size of the muscle-fibres concerned. The absolute strength of a muscle is determined by the size and the number of its muscle-fibres. The different degrees of response that may be obtained on stimulation of a motor nerve are due to the number of nerve-fibres, and therefore the number of muscle-fibres, excited by different stimuli. A strong stimulus excites many or all of the nerve-fibres and therefore brings into action many or all of the corresponding muscle-fibres, and the result is a strong contraction of the muscle; while a weak stimulus excites few nerve-fibres and brings into action few muscle-fibres, and we get a weak contraction.

For a given muscle, therefore, the strength of a contraction is the direct expression of the number of nervous impulses sent into it. Much of what is commonly spoken of as muscular weakness has nothing whatever to do with the muscles, but is entirely a question of nervous energy. I would add here that we speak loosely—perhaps conveniently—of the education or re-education of muscles. But, of course, you can no more educate a muscle than you can educate a liver or a bone. The only thing that you can educate is a reflex—that vital process which occurs exclusively in connexion with the terminations of a nerve-cell. It is not sufficiently recognised that the basis of so-called remedial gymnastics and re-education is neurology.

The muscles on one aspect of a joint are sometimes called the antagonists of those on the opposite aspect. This is an unfortunate choice of a word to express a mere anatomical fact. Muscles do not oppose one another, they coöperate. When movement takes place, the contraction of one group of muscles is accompanied by reciprocal elongation of the opposite group, and the nervous impulses which cause the latter to relax are the direct outcome of those which make the former contract. Even when muscles on both sides of a joint contract simultaneously, as in the fixing of a posture, this is not antagonism, but a concerted action. Paralysis of reciprocal innervation gives rise to a grave functional disorder, which we call spastic paralysis. This, if you like, may be called antagonism.

Now, speaking still of movement in muscle-fibres, it is well known that the nature of the response differs in different kinds of muscle. Thus the typical twitch in striated or skeletal muscle is a sudden quick contraction which rapidly reaches its maximum and almost as rapidly falls away; while the contraction of smooth or unstriated muscle is relatively slow and prolonged, presenting a gradual rise and a still more gradual fall. What is the difference? Both kinds of fibre are subjected to a similar change of surface tension; why does one respond quickly and the other slowly?

I introduce this question here because, as we shall see, it has an important bearing upon another question which has become prominent recently—namely, the question of the dual structure of muscle. Note that we are now considering the phenomenon of movement in two different kinds of muscle-fibre. It seems that the different rates of response to stimulation of striated and unstriated muscle respectively can only be due to the fact that one kind of fibre offers more, and the other less, resistance to the force which brings about its change of shape. In other words, it is a question of the internal resistance or viscosity of the cell substance. Now, viscosity is a physical property which can be made to change, and it is significant that in certain circumstances, for example, in veratrin poisoning and in the condition known as decerebrate rigidity, the contraction of striated muscle approximates in character to that of unstriated muscle.

POSTURAL ACTIVITY OF MUSCLE.

The postural activity of muscle is concerned, not with the execution of movement, but with the prevention of movement—that is, the posturally acting muscle develops within it a state of tension or resistance to a force which is trying to stretch it without itself necessarily undergoing any outward change.

The most remarkable features of this activity are: (1) The "lengthening" and "shortening" reactions by which the muscle adapts itself to different lengths while maintaining the same tension. It was this property which led Sherrington to apply the term "plastic tonus" to postural activity. (2) The fact that it entails hardly any appreciable increase of metabolism, so that it can be maintained almost indefinitely without exhibiting any signs of fatigue.

Now, this state of tension or resistance might be brought about by a change of surface tension of the muscle-fibres, similar to that which produces movement—by an isometric contraction of the muscle, in fact—and this actually is the means by which resistance is offered to a force greater than that which is developed in ordinary postures. But, as we have seen, this phasic activity of muscle is accompanied by a great expenditure of energy and by the rapid onset of fatigue, so that it cannot be maintained for long. On the other hand, the postural activity of muscle is maintained with hardly any perceptible increase of metabolism, and it is almost incapable of fatigue.

Clearly we are dealing here with quite a different mechanism. It has been likened to a ratchet or catch mechanism by which a state of tension may be maintained indefinitely without the expenditure of any energy. In the living cell such a condition can

be attributed only to some change in the physical characters of the cell substance.

The viscosity of cell substance is known to vary significantly at different times in the life of the cell, and Bayliss showed that visible changes in viscosity may be brought about by disturbances such as are called stimuli. It is known that colloidal solutions in certain circumstances have the property of setting or clotting—like the setting of a solution of gelatin on cooling—and that they then offer a resistance to deforming forces many times greater than they could while in the fluid state. This is a physical reaction and reversible, and it has been suggested that the postural activity of muscle is a similar reaction controlled by its special nervous mechanism. So that in the language of physical chemistry the postural activity of muscle consists of a change from sol to gel, and herein lies the explanation of a state of tension or resistance developed without preceptible increase of metabolism and maintained without fatigue.

From the physiological point of view there appears to be no reason why these two functions, movement and posture—the one a change of surface tension and the other a change in the molecular arrangement of the cell substance—should be performed by different structures, by different parts of the muscle-fibres, as originally suggested by Bottazzi, or by actually different muscle-fibres, as recently claimed by Hunter. Indeed, in view of the close coördination that exists between movement and posture in higher animals, an anatomical separation would appear to be a positive disadvantage. Such a primitive arrangement obtains in some invertebrates in whom these functions are of the simplest order. But, in vertebrates, so far as can be made out, movement and posture are different reactions of the same muscle-fibres. Indeed, the more closely the question is studied, the more it appears that postural activity is but a further degree of that viscosity or internal resistance which we have seen is a variable quality in muscle-fibres performing movements.

THE QUESTION OF SYMPATHETIC INNERVATION.

It is necessary, therefore, to examine somewhat critically the evidence recently put forward by Hunter and Royle in support of their contention that the functions of movement and posture are performed by entirely different sets of muscle-fibres, the movement fibres being supplied by the ordinary spinal nerves and the postural fibres by the sympathetic. An excellent review of the whole question by Walshe has just appeared in the last number of *Medical Science, Abstracts and Reviews*,[1] so I shall be very brief.

It has long been known that the skeletal muscles receive accessory, non-medullated, or sympathetic nerve-fibres in addition to the ordinary spinal nerves. These consist of fine fibres connected on the one hand with the perivascular sympathetic nerve plexuses and ending in the muscle-fibres independently of the motor end-plates.

The presence of these fibres seems to have caused some surprise, and there has been much speculation as to the functions which they could possibly serve. But there are two points which I have not found mentioned in any of these discussions. First, are not all functioning tissues supplied by the sympathetic? Function is accompanied by an increased blood-supply which is ensured by reflex vaso-dilatation through the sympathetic. Second, in warm-blooded animals the skeletal muscles are the chief source of heat. Heat is conserved by muscular activity and peripheral vaso-constriction, while heat loss is promoted by muscular relaxation, peripheral vaso-dilatation, and sweating. These are nicely coördinated sympathetic reactions, and it is therefore not surprising to find that sympathetic nerve-fibres go to the skeletal muscles. It should also be noted that it is phasic, not tonic, muscular contraction that gives rise to heat.

Hunter's work started from the observation of Kulchitsky that "the medullated and non-medullated fibres never end in the same muscle-fibre." This is at best a negative observation and contrary to the findings of Boeke, Agduhr, and others. In fact, Hunter himself said that the question must be decided on the experimental evidence.

EXPERIMENTAL AND CLINICAL EVIDENCE.

For a criticism of the experimental and clinical evidence in detail I shall refer you to Walshe's excellent paper.[1] Here I shall content myself with quoting his main conclusion that the experiments and the clinical cases are not conclusive, and the descriptions thereof contain details not explicable on any theory of sympathetic function. Others working on the same lines have failed to obtain results approaching those claimed by Hunter and Royle. In short, it may be said that the whole weight of evidence—histological, experimental, and clinical—is against the hypothesis of a specific innervation of the tonic or postural activity of skeletal muscle by the sympathetic; against the separation of muscular tone into two elements—"contractile" tone and plastic tone; and against the conception of a dual structure of muscle.

To this I will briefly add my own small experience on the clinical side. I have done the operation of sympathetic ramisectomy ten times, lumbar ramisectomy nine times, and cervical ramisectomy once. All but one were typical cases of spastic paralysis exhibiting the plastic tonus described by Sherrington. The odd case was one of paraplegia in flexion with pronounced flexor spasms, and it is interesting to note that the result, such as it was, of the operation in this case was at least as well marked as in any other case that I have seen. In four cases no appreciable effect on the muscular condition was noted after operation. In six there appeared to be a definite, though slight, diminution of the muscular spasm. It has seemed to me to be about comparable to the amount of relaxation that might be expected from the accompanying vaso-dilatation. In no case have I been able to persuade myself that it was of real benefit to the patient.

This experience seems to be similar to that of all others who have tried the operation of sympathetic ramisectomy in this country and in America. Similar results were also obtained in the two cases chosen by Hunter and Royle out of a series of 25 cases specially selected for the purpose, and operated upon by Royle in Boston in October, 1924. It therefore seems unlikely that this operation will survive long as a method of treating spastic paralysis, and I would reaffirm my belief that for the treatment of uncomplicated spastic contracture Stöffel's operation on the peripheral nerves remains the best method hitherto devised. Physiologically it is the nearest approach we can get to the natural means of regulating the strength of a muscular contraction.

A PROPRIOCEPTIVE REFLEX EVOKED BY STRETCHING.

Sherrington has shown that the tonic or postural activity of muscle is a proprioceptive reflex arising in the muscle itself. Further, Liddell and Sherrington have shown that the adequate stimulus for this reflex is stretching of the muscle. Thus, the tendency of the lower limbs to bend under the body-weight evokes a stretch reflex or tonic action of the extensor muscles, which persists as long as the stretching force is acting. This, then, is the mechanism by which the upright position of the body generally is maintained. Normally, postural activity is found only in the antigravity muscles—that is, those which constantly resist and counteract the action of gravity. The centre for this reflex is in the mid-brain, and it is known to be controlled and influenced by the labyrinths, the cerebellum, and the cerebral cortex.

I have dealt elsewhere [2] with the bearing of these facts upon the ætiology of postural deformities. Here I will only remind you that postural deformities are due to default of the normal postural activity of the

muscles, and their treatment comprises: (1) correction of the deformity, if possible; and (2) re-education of the postural reflex.

For these purposes remedial exercises or gymnastics are extensively employed, consisting almost entirely of movements performed in various ways. And, in view of what has already been said, we may ask ourselves this question: If movement and posture are two entirely different mechanisms, what is the good of performing movements in order to educate posture? Experience proves that it is some good. Movement and posture, though distinct, are nevertheless closely associated. Postures are changed by movements, and change of posture is the adequate stimulus for postural activity. The important point is that it is not the movement per se, but the fixing of the postures attained by movement that constitutes the real exercise.

There is too much arm-and-leg wagging in the schemes of most gymnasts. Conventional Swedish exercises are based upon the erroneous idea that postural deformities are due to weak muscles, and it is sought to strengthen these muscles by making them perform repeated movements. An interesting experiment has been made in applying the technique of certain forms of dancing—so-called operatic dancing—to the re-education of posture. It is interesting because not only does it provide for most patients an attraction which is wholly wanting in ordinary remedial exercises, but the essence of this form of dancing is the posing or fixing of postures as distinct from the movements employed to attain them. A recasting of remedial exercises on these lines is long overdue.

Movement and Postural Activity.

But it is a mistake to think of posture as merely a state of immobility. Movement and postural activity are closely associated in many, if not most, of the ordinary actions of muscles. It has been shown that the simple stretch or myotatic reflex—as Sherrington calls it—consists of two parts: a short-lasting relatively intense phasic reaction, and a less powerful longer-lasting tonic reaction. So that, for instance, when weight is suddenly thrown upon a partly bent limb there is a brief powerful phasic contraction of the extensors to take up the sudden strain, and a prolonged tonic reaction to maintain the posture, or, in other words, to prevent the limb from bending. Thus at every step in walking and running and in many other movements a postural reaction is evoked which fixes the part, if only for a moment, in the position to which it has been brought.

Students are taught that the action of a muscle is the effect of approximating its origin and insertion. Thus, for example, the student learns that the action of the quadriceps is to extend the knee-joint. It is nothing of the sort. It is true that the quadriceps does extend the knee, but that is a very small part of its action. The great function of the quadriceps is to prevent the knee from bending. It is one of the great postural muscles of the lower extremity, and as its action is of considerable interest and importance to orthopædic surgeons it may well be taken as a type.

The functions of standing, walking, and running are essentially reflex in character. Of course, they are influenced in various ways by voluntary action; but essentially they are reflex. The postural reflex activity of the quadriceps is essential for all these functions. Failing this, the individual may be able to control the knee for a time by an extraordinary voluntary effort. But voluntary effort cannot be continued indefinitely, and when it fails, the muscle lets the knee down. This is the familiar condition of quadriceps insufficiency so common after injuries and diseases of the knee-joint, and it is noteworthy that powerful voluntary extension of the knee may be possible in cases of marked quadriceps insufficiency.

What is Reflex Atrophy?

In every serious injury or disease of the knee-joint rapid wasting of the quadriceps is one of the first signs to appear and the last to disappear. As we are now taking the quadriceps as a type, these remarks apply equally to many other regions of the body. So far as I know, no adequate explanation of this muscular atrophy has ever been suggested. It is much more than a mere disuse atrophy. It is obviously some active process. It has been called reflex atrophy; but what is reflex atrophy? There is no evidence of any specific trophic innervation of muscles.

I would suggest that there are two physiological factors responsible for this type of atrophy. One, a reflex inhibition of the postural or tonic activity of the muscle, about which there is no doubt whatever, and the other, a reflex excitation of the phasic activity of the same muscle, or, in other words, an attempt at reflex protective spasm.

Now, postural activity alone is able to maintain a state of tension for long periods with hardly any increase of metabolism, as in maintaining ordinary postures. With the help of postural activity a mild phasic activity also can be maintained very economically, as in the condition of decerebrate rigidity. But without the support of postural action prolonged phasic activity is a most extravagant form of energy and it leads to a rapid using up of the materials from which the energy is derived.

Some years ago Langley[3] suggested that the atrophy of paralysis following nerve injuries was due, not to disuse, but on the contrary to excessive activity of the muscle brought about by the traumatic excitation of the nerve. He did not mention the tonic or postural activity of the muscle, but, as this is abolished in peripheral nerve injuries, the same explanation may be applied also to this case.

Treatment must include Adequate Stimulus.

It is worth while perhaps to consider for a moment the means which are commonly employed in treating quadriceps insufficiency, apart from the treatment of any underlying cause. The means are: (1) massage, (2) electrical stimulation, and (3) exercises consisting almost invariably of movements of extension of the knee. Each of these methods is capable of developing a wasted muscle, but not one of them is an adequate stimulus for the postural activity of muscle. Sherrington remarked upon the difficulty of producing anything approaching postural activity by artificial means, such as electrical stimulation. However, by what I regard as for the most part a fortunate accident, the mere development of a muscle makes it better able to regain its postural activity by taking natural exercise. But we have all met with cases of quadriceps insufficiency which have responded to treatment up to a certain point and then have ceased to improve. It is well then to remember that the adequate stimulus to the postural reflex is stretching of the muscle, provided, of course, that the muscle is able to resist it, and cases of quadriceps insufficiency will often show an astonishing improvement as soon as they are put on adequate resistance exercises.

It is instructive to put beside this the well-known clinical fact that stretching of a muscle, when it fails to evoke the corresponding reflex, as in a paralysed muscle, is a most injurious factor.

Sometimes, when the quadriceps muscle is paralysed, the operation of transplanting the hamstrings or some of them into the patella is performed with the idea that the transplanted muscles shall take the place of, and function as, the paralysed one. This operation is as physiologically unsound as it is generally useless. Such cases are often shown holding the knee extended or walking at surgical meetings. But the condition is at best one of complete quadriceps insufficiency. Postural activity is not normally found in the flexors of the joint, and no one has ever yet succeeded in imposing a postural reflex on a muscle transplanted from the flexor group. Therefore, when the patient

forgets his knee and ceases to walk with voluntary effort, as he must do sooner or later, the muscles let him down. A similar objection applies also to some other tendon transplantation operations, especially in the lower extremity. For example, the peronei cannot be made to take on the postural action of the tibial muscles, nor can the tibials be made to take part in the stepping reflex which is normal to the peronei.

In contrast to these are some tendon transplantation operations in the upper extremity, notably that for musculo-spiral paralysis. Here the muscles are concerned with voluntary movements of precision, and the true substitution of one muscle for another is frequently possible.

There are many other questions concerned with muscular activity that one would like to hear discussed. The influence of muscular activity on bone growth; the significance of postural deficiency in rickets; the nature of organic contracture of muscle. What is cramp? Is not chronic constipation a symptom, rather than a cause, of postural deficiency? And if you think that here I have overstepped the bounds of orthopædic surgery, let me remind you (1) that there are many people who think that intestinal stasis plays an important rôle in orthopædic conditions, such as chronic arthritis; (2) that Sherrington has shown that the postural activity by which the muscular walls of the intestines and other hollow viscera adapt themselves to changes in the volume of their contents is precisely similar to the postural activity of the skeletal muscles by which the upright position of the body generally is maintained; and (3) that Arbuthnot Lane has said that he was led to his views on chronic constipation by his observations on scoliosis. Now, scoliosis is a subject about which orthopædic surgeons, rightly or wrongly, think they know something, and surely, if it is permissible to argue from scoliosis to constipation, an orthopædic surgeon may be allowed to hold an opinion.

THE NEW SURGERY.

In these rather scattered remarks I have tried to indicate what I believe to be the most distinctive feature of orthopædic surgery to-day. A change is coming over surgery. The old surgery, by long tradition based exclusively upon anatomy and pathology, is passing away, and its place is being taken by a surgery which takes into account also the functions of the living body. In other words, mechanical surgery—mere technique—is not everything, and physiology is coming into its own.

In this respect orthopædic surgery undoubtedly leads the way, and it is already far ahead of any other branch of surgery. This is the explanation of the long treatment—often miscalled after-treatment—which is so unpopular with the surgeon who looks for quick returns, but which is so essential a part of orthopædic methods. This also is the reason why fractures must be treated by orthopædic methods—whether by orthopædic surgeons or others. For a fracture is not only a broken bone, but a grave disturbance of function, and we know to our cost—or should I say, to our profit?—that the mere mending of a fracture in good position is not necessarily followed by perfect restoration of function.

The physiology of muscular action, with which I have dealt so imperfectly here, is but one instance of the fundamental relationship between physiology and orthopædic surgery.

References.—1. Medical Science, Abstracts and Reviews, vol. xii., No. 6, p. 437; see also vol. x., No. 6, p. 484. 2. Brit. Med. Jour., April 23rd and 30th, 1921. 3. Ibid., Aug. 14th, 1920.

NORFOLK AND NORWICH EYE INFIRMARY.—This institution, which was founded in 1822, has now been amalgamated with the Norfolk and Norwich Hospital. The rearrangement provides for the maintenance of the Eye Infirmary as a separate entity administered by a committee appointed by the board of management of the hospital, and until the new premises which it is hoped to obtain are available the work will be carried on in the present building.

ON THE
NATURE OF URINARY PROTEIN,
WITH SPECIAL REFERENCE TO CASES OF ECLAMPSIA.

BY ALEXANDER HYND, M.A., D.SC.,
CHEMISTRY DEPARTMENT, JAMES MACKENZIE INSTITUTE FOR CLINICAL RESEARCH, AND PHYSIOLOGY DEPARTMENT, THE UNIVERSITY, ST. ANDREWS.

OWING to the very large number of hypotheses advanced concerning the ætiology of eclampsia, Zweifel some years ago aptly described it as "the disease of theories," and although, since then, as will be found in reviews of the subject in *Medical Science* (1921) and also by Hammett (1924) and by Bailey (1924), much work has been done and many suggestions offered to elucidate this perplexing condition, the ætiology of eclampsia still remains an unsolved problem.

Although cases of eclampsia have been described without any protein being detected in the urine, proteinuria is almost a constant finding, and is frequently very pronounced. The protein in such cases has usually been regarded as a mixture of serum albumin and serum globulin, with perhaps proteoses in addition, but definite proof of this seems lacking, and the experiments described in the present communication throw doubt on the statement.

About three years ago, in the course of an examination of the urine from a typical case of eclampsia, the author determined the optical activity of the urine and found it considerably less lævorotatory than was expected considering the protein content of the specimen. As search for the presence in measurable amount of other optically active compounds proved negative, and as removal of the protein yielded an inactive filtrate, the matter was more carefully investigated, as is detailed in the experimental part which follows.

Experimental Methods.

The experimental methods employed were identical in every case.

The urine was collected under a layer of toluene in glass-stoppered bottles, and as large a volume of urine as was available, usually about half a litre, was employed, but in Cases No. 1 and No. 3 as much as two litres were worked up, while the smallest quantity utilised was 270 c.cm. in Case No. 26. After separating any excess of toluene, the reaction of the specimen was adjusted, by the addition of sodium carbonate or acetic acid as the case required, till practically neutral to litmus paper, and the urine then filtered through a folded paper. As a rule, no difficulty was experienced in obtaining a perfectly bright clear filtrate, though a number of cases were encountered which gave turbid solutions. As this turbidity, being due to bacteria, was found to persist at the later stages, thus rendering polarimetric observations not only difficult but unreliable, all such cases were discarded.

The globulin and albumin present in the clear filtered urine were then fractionally precipitated by means of sodium sulphate at 40° C. As the protein content of the final solutions was calculated from nitrogen estimation by Kjeldahl's process, sodium sulphate was preferred as a precipitant to the more convenient ammonium salt, and the pure anhydrous sodium sulphate was used so as to avoid the large increase in volume which occurs with the crystalline salt. As Howe (1921) has shown that all the globulins are thrown out of solution when the sodium sulphate reaches a concentration of 21·5 per cent., sufficient of the finely powdered anhydrous salt was added to the urine to bring the concentration to approximately 22 per cent., and the mixture left in an incubator at 40° C. for some hours. The precipitated globulin was removed by filtration while warm, and the filtrate then saturated at 40° C. with anhydrous sodium sulphate to obtain the albumin. As the globulin fraction in practically every case represented only a small proportion of the total protein, attention was directed to the albumin fraction. The crude albumin, obtained as just described, was dissolved in cold water, the solution filtered, and the globulin and albumin fractionally precipitated with sodium sulphate at 40° C. as before. This process was repeated several times, usually six or seven, and as a rule after the fourth precipitation no globulin was present. The

final precipitate of pure albumin (that is, free from globulin) was redissolved in water, and the solution dialysed until free from sulphate. The protein content of the resulting solution was then estimated and its optical activity determined.

The protein from two litres of urine from a case of typical eclampsia (see No. 1 in Table II.) was isolated, and the albumin separated from the globulin as described above. After dialysis against running tap-water for six days, then for two days against large volumes of distilled water, the solution of albumin was quite clear, only slightly brownish in colour, and free from sulphate as indicated by the absence of the ring test with barium chloride. The rotation of the solution was then determined, using a Hilger polarimeter with tripartite field, by which readings accurate to 0·01° are obtained. The mean of 12 readings for α in a 1-decimetre tube was −0·22°, and as the protein content by Kjeldahl's method (mean of four determinations, which all agreed closely) was 0·5806 per cent., hence the specific rotation of the albumin present in the urine was −37·89°.

Owing to the small amount of material available no attempt was made to obtain the albumin in the crystalline state, but the experiment was repeated with another quantity of urine from the same case, and a similar result was obtained—the value for the specific rotation of the albumin present in the urinary protein being −39·48°. As the preliminary examination of the urine and these two carefully conducted experiments with purified albumin clearly indicated the presence of an albumin with a lævorotation considerably less than the published values for serum albumin (see Table IV.), it was decided to determine the optical power of the albumin excreted in all the available cases of albuminuria in pregnancy, where the amount of protein was of a sufficiently high order.

Experimental Results.

Twenty-six cases have now been examined in the manner just indicated. Twelve of these were diagnosed by the clinician in charge as albuminuria of pregnancy, and are tabulated in Table I., while 14 were described as of the eclamptic type and are tabulated in Table II.

In the cases of albuminuria of pregnancy (without convulsions), the specific rotation of the urinary albumin excreted ranged from −48·9° to −65·7°, with a mean value of −55·81°. Inspection of the cases in Table II. at once reveals the fact that the cases diagnosed as "eclampsia" are sharply divided into two groups, which for convenience may be referred to as the "low" and the "high" optical group respectively. In the "low" group, consisting of eight cases, the specific rotation of the urinary albumin ranged from −33·92° to −41·61°, with a mean value of −38·5°, while in the "high" group of six cases, the specific rotation varied from −49·4° to −58·67°, with a mean value of −56·37°. The possible significance of these values will be dealt with later.

The same method of examination of the urinary albumin was applied to five cases of proteinuria not accompanied by pregnancy. These are tabulated below in Table III. and include two typical cases of chronic nephritis and three of functional or orthostatic albuminuria—two of the latter being girls of about 12 years of age and the third a youth of 16 years. The value of the specific rotation of the albumin excreted by the kidney in these cases varied only slightly—namely, from −52·23° to −57·55°, with a mean value of −54·27°.

Optical Rotatory Power of Human Serum Albumin.

An experiment was then carried out to determine the optical rotatory power of human serum albumin, which had been subjected to identically the same treatment as the urinary albumin. For this purpose, Dr. X volunteered to provide the necessary blood, and 100 c.cm. was removed by vein puncture in the usual manner. After standing overnight, fully 50 c.cm. of clear serum were removed from the clot by means of a pipette and then centrifuged. The globulin present was then separated by the addition of the necessary amount of sodium sulphate following the same method as already described for the urine. Thereafter, the albumin was isolated from the globulin-free filtrate by saturation with sodium sulphate at 40° C. The precipitated serum albumin was removed by filtration, redissolved in water, and the process repeated four times. A portion of the solution of albumin then resulting was filtered through a No. 2 Chamberland candle and the optical activity and nitrogen content of the clear yellow-brown solution determined. From the Kjeldahl estimations, the protein content of the solution was calculated to be 1·285 per cent., and α in a 2 decimetre tube was −1·36°, so that the specific rotation of the serum albumin equalled −52·92°.

The remainder of the albumin solution was dialysed until free from sulphate. The resulting solution had a protein content of 5·121 per cent., and gave in a 1-decimetre tube $\alpha = -2·79°$, so that $[\alpha]_D = -54·47°$. The protein in solution was then precipitated by the addition of five volumes of alcohol, centrifuged, washed twice with alcohol and then with ether, and afterwards dried in a vacuum desiccator over calcium chloride. Approximately 1 per cent. solutions of the human serum albumin obtained as just described gave the undernoted rotations in the solvents indicated in Table IV.

TABLE I.—CASES DIAGNOSED AS "ALBUMINURIA OF PREGNANCY."

Case No.	Age in yrs.	No. of pregnancy.	Month of pregnancy.	Condition of patient.	Mammary gland.	Child.	Urine.	% protein.	$[\alpha]_D$ of protein.
									Degrees.
5	18	1	9	Œdema of feet and legs; B.P. 150/110.	—	Alive, slightly premature.	Catheter specimen; hyaline and granular casts.	1·27	−59·3
11	22	1	6	Considerable œdema.	—	Dead, premature.	Slight deposit of urates; no casts detected.	0·78	52·07
15	23	1	9	Nothing abnormal except proteinuria.	A.	Alive, mature.	Catheter specimen; turbid due to bacteria.	0·808 2·66	49·5 48·9
18	23	1	—	Marked œdema generally.	I.A.	Dead, mature.	Very dark-coloured urine.	0·274	65·7
21	24	1	9	—	A.	Alive, mature.	Catheter specimen; bacteria numerous.	0·31	51·02
25	26	1	9	—	—		Some R.B.C. and polymorphs.	0·166	54·2
27	19	1	9	Œdema of legs; eyelids puffy.	—	Discharged from hospital	Urates and a few polymorphs.	0·265	49·05
30	—	1	8	—	—		Leucocytes and a few R.B.C.	0·226	53·21
31	—	—	8	—	—	undelivered.	Leucocytes; granular casts; a few uric acid crystals.	0·15	60·0
38	—	—	—	—	—	—	Numerous R.B.C. and acetone bodies present.	0·357	56·09
41	—	1	—	Had one fit after delivery.	—	—	Numerous hyaline and granular casts.	0·14	64·28
42	25	1	9	—	V.A.	Twins, alive and mature.	Brown colour; trace of bile pigment.	0·85	62·31

TABLE II.—CASES DIAGNOSED AS "ECLAMPSIA."

Case No.	Age in yrs.	No. of pregnancy.	Month of pregnancy.	Condition of patient.	Convulsions.	Mammary gland.	Child.	Urine.	% protein.	$[\alpha]_D$ of protein.
										Degrees.
1	26	1	7	Face puffy; no œdema of ankles; had severe headache before convulsions started. Uninterrupted recovery.	10 fits; patient quite unconscious after the third fit.	I.A.	Dead, premature.	Considerable albuminuria with hyaline and granular casts. Chloride excretion low. Only a trace of protein 9 days after delivery.	0·5806	−37·89
									0·5825	39·48
2	24	1	9	Patient became blind (temporarily).	No fits.	I.A.	Alive, mature.	Moderate albuminuria; only a trace of protein 2 days later.	0·748	40·11
									0·4917	39·65
8	—	—	—	—	Post-eclamptic.	—	—	—	0·57	39·54
13	27	1	9	B.P. increased to 158 in spite of treatment. Mental condition abnormal for about 10 days after eclamptic seizure. A week later patient discharged quite recovered.	First fit 1 hour after delivery; had 22 fits.	I.A.	Alive, mature.	Catheter specimen; marked albuminuria. Deposit of urates.	1·06	33·92
										34·97
22	35	3	7½	Œdema of feet and ankles; sudden amaurosis, severe headache and vomiting before fits began. B.P. rose from 140 to over 200 and continued high until delivery 3 weeks later. Discharged well a fortnight after birth.	3 fits; patient comatose afterwards.	I.A.	Dead, premature.	Granular and hyaline casts; considerable albuminuria. Trace of protein in urine 3 months later.	0·4567	35·02
									0·9716	38·1
									0·482	37·35
32	37	1	7½	Swelling of face and legs. B.P. 170 to 200. 2 fits. Labour induced. After labour urine output increased and œdema graduallydisappeared. Discharged 11 days after labour, with no albumin.	1 fit before admission and 1 fit after admission, which lasted a minute.	I.A.	Alive, premature.	Triple phosphate crystals present. Numerous hyaline and granular casts. Acetone bodies present. Only very slight trace of protein a month later.	1·72	39·57
									1·65	41·21
									1·826	41·61
34	37	—	—	Œdema of ankles for 3 weeks. Headache and dimness of vision. B.P. 145/100. Severe headache before convulsions. Patient died 2 hours after delivery (hæmorrhage, toxæmia, and shock).	6 fits (antepartum).	I.A.	Alive, mature (died 2 hours after).	Urine had a very marked red-green fluorescence. Marked albuminuria with many R.B.C. and hyaline and granular and epithelial casts. Acetone bodies present.	1·65	39·39
									1·397	37·03
									0·6225	38·58
40	21	1	9	Patient admitted to hospital in comatose condition. Face cyanosed. Typical eclamptic convulsions. Mentally unstable for 3 weeks. B.P. 135–140 after delivery. Patient well nourished (instrumental delivery).	11 fits before delivery, 25 after.	—	Alive, mature	Urine had a greenish-red fluorescence.	1·4	40·7
12	21	1	7	Pre-eclamptic. B.P. 158.	6 fits.	—	Discharged undelivered.	Deposit of urates; marked albuminuria; 4 days later only a trace.	2·372	57·32
									2·439	55·76
14	28	1	9	Œdema under eyes. B.P. 158.	17 fits; first being 1 hour after delivery.	—	Alive, mature.	Catheter specimen; deposit of urates.	0·6277	49·4
									0·9275	56·06
16	26	1	9	Œdema of legs and feet. B.P. 165.	8 fits; first fit immediately after delivery of head.	A.	Alive, mature.	Catheter specimen; deposit of urates.	0·5917	58·48
17	22	1	9	Œdema and headache. B.P. 210. Patient died probably of septicæmia.	9 fits after delivery.	I.A.	Alive, mature.	Catheter specimen.	0·1554	57·9
20	22	—	8	Patient unconscious. B.P. 150.	18 fits.	—	Alive, premature.	Catheter specimen; deposit of urates, and some casts detected.	1·687	58·67
29	27	1	—	Patient slightly confused. B.P. 165. Instrumental delivery. Developed chest symptoms and abdominal distension. Discharged after a fortnight with slight albuminuria.	A number of fits both before and after delivery (7 fits in all).	—	Dead, mature.	Triple phosphate crystals; a few W.B.C. and R.B.C. Granular casts.	0·2264	57·4

A. = active. I.A. = inactive. V.A. = very active.

TABLE III.—*Cases of Albuminuria not Complicated by Pregnancy.*

Case No.	Age in yrs.	Sex.	Condition.	% protein.	$[\alpha]_D$ of protein.
					Degrees
3	32	F.	Chronic nephritis, July, 1922	0·395	−53·3
			" " Aug., 1922	0·8776	57·55
			" " April, 1923 (d. Oct., 1924)	2·5895	55·42
4	40	F.	Chronic nephritis.	0·98	52·56
10	16	M.	? Orthostatic albuminuria.	0·475	52·23
24	12	F.		1·125	53·32
26	12	F.		0·1421	56·7

TABLE IV.

Solvent.	Concentration of solution.	Specific rotation.
Water	0·927 %	−52·86°
1 % sodium chloride ..	0·991 %	−52·5°
N/4 sodium hydroxide .	0·923 %	−68·25° → −17·55°

The racemisation curve for the human serum albumin was also determined for a 1 per cent. solution in N/4 sodium hydroxide, as described by Woodman (1921). It was hoped that this might later prove useful for comparative purposes. The data are given in Table V.

TABLE V.—*Human Serum Albumin.*

1 % in N/4 NaOH.

A = Time in hours. B = Specific rotation.

A.	B.	A.	B.	A.	B.
1	−68·25°	27	−45·50°	150	−24·92°
3	60·67°	55	34·90°	200	18·38°
7	53·09°	80	29·25°	240	17·55°

Optical Rotatory Power of Cow's Lactalbumin.

As it was impossible to obtain sufficient human milk for the isolation and polarimetric examination of human lactalbumin, the optical rotatory power of cow's lactalbumin was determined. Two quarts of fresh dairy milk were allowed to stand for some time and the cream then removed as completely as possible by skimming. To the skimmed milk (1850 c.cm.) two volumes of water (3700 c.cm.) were added, and the casein precipitated by the gradual addition of acetic acid with stirring. To complete the precipitation 17 c.cm. 10/1 normal acetic acid were required. Sufficient toluene was then added to form a film on the surface of the mixture, which was left to settle overnight. The clear supernatant fluid was syphoned off and then evaporated to a tenth volume at 30° to 40° C. under diminished pressure. The concentrated solution, after filtration through a folded paper, was warmed to 40° C. and treated with sufficient anhydrous sodium sulphate to give a 17·5 per cent. solution. The resulting precipitate was filtered off and the filtrate saturated with sodium sulphate at 40° C. The precipitated proteins were then dissolved in about 300 c.cm. of water, and the fractionation of the globulin and albumin carried out as previously described for urine and blood serum. The albumin solution was then dialysed until free from sulphate, concentrated somewhat in vacuo at 30° C., and after filtration through a No. 2 Chamberland candle its rotation and protein content were determined. From the Kjeldahl estimation the protein content was 0·9108 per cent., and the mean of ten readings for α in a 1-decimetre tube was −0·375°, so that the specific rotation of cow's lactalbumin

$$= \frac{-100 \times 0{\cdot}375}{1 \times 0{\cdot}9108} = -41{\cdot}17°$$

Nature of Urinary Protein.

Considerable attention has been directed to the nature of the protein excreted in the urine in different diseases, but apart from the well-known case of Bence-Jones's protein (1848), and the crystalline globulin isolated by Noel Paton (1892), the coagulable urinary protein almost invariably has been regarded as a mixture of serum proteins. Senator (1874) drew this conclusion as far back as 1874, and this view, supported as it was by later biochemical tests, has persisted in spite of the fact that the presence of other proteins in the urine has been established (van Noorden, 1907). Consequently greater attention was given to investigations, such as those by Cloëtta (1891) and more recently by Mandelbaum (1919) and others, in which attempts were made to correlate the various diseases exhibiting proteinuria with the magnitude of the albumin to globulin ratio. Work of this type has proved of little value (Noel Paton, 1890), but with our increasing knowledge of the proteins themselves and improvements in our methods not only of distinguishing the different types of proteins, which may occur in urine and to which Cavazzani (1921) has recently urged attention, but also of differentiating the several members of the same group of proteins, it seems likely that by a more careful study of the chemistry of the proteins excreted in the urine some light may be thrown on at least certain types of proteinuria, the clinical importance of which has been fully appreciated by all physicians for many years.

It is well recognised that in the study of the carbohydrates, the determination of the specific rotatory power as a means of characterising and establishing the identity of the various members of the group has proved of the greatest value. In spite of the adverse opinion of Robertson (1918), the use of the polarimeter in the study of the proteins would seem to be equally useful, and recent work points in this direction. Thus the important results obtained by the racemisation method, introduced by Kossel (1912) and elaborated by Dakin (1912) and others (1913), are dependent on the detection of changes in optical activity. Further, the observation of Sebelien (1885), made 40 years ago, that the specific rotations of the albumins in serum and in milk were different is supported by the most recent chemical analyses (Hartley (1914), Crowther and Raistrick (1916), and Woodman (1921)). In the experiments described in the present communication it is shown that the albumin excreted in the urine in different conditions has not always the same rotatory power. From th is the reasonable conclusion is drawn that the urinary albumin may vary in kind—a result which would be difficult to obtain by any other method, although recently Ishiwara (1923), by a modified Abderhalden reaction, has differentiated the protein appearing in the urine in pregnancy from those in chronic and acute nephritis. Moreover, the polarimetric method has the further advantage that it indicates the *possible* nature of the protein in question. Thus, the mean value for the specific rotatory power of the albumin excreted in the cases of "albuminuria of pregnancy" without convulsions (Table I.) was −55·81°; that in six cases of the "high optical" eclamptic group (tabulated in Table II.) was −56·37°; and that in five cases of albuminuria not associated with pregnancy (tabulated in Table III.) was −54·27°. All these values agree closely with those obtained by the author for human serum albumin prepared by an exactly similar process—namely, −54·47°, −52·92°, and −52·86° (see above). It may be noted also that the values, while considerably less than the exact figure, −62·83°, reported by Young (1922) for crystalline horse serum albumin, approximates the values given by Lewis (1922) and also the earlier values recorded in the literature for serum albumin. These are summarised in Table VI.

From Table VI. one is tempted to conclude that the albumin excreted in the urine in the conditions

referred to above is probably identical with serum albumin. This is in agreement with the generally accepted view, but the results obtained by Sammartino (1922) must be considered. This worker applied

TABLE VI.

Observer.	Date.	Remarks.	Specific rotation.
Fredericque ..	1880	Amorphous material.	−56·07° to −58·41°
Starke	1881	Do. in aqueous solution.	−60·05°
Sebelien	1885	Dialysed solution in water.	−60·1° to −62·6°
Michel	1896	Crystalline material.	−61°
Maximovitsch	1901	„ „	−47·47°
Piettre and Vila	1921	Amorphous material (acetone); horse.	−54° to −58°
Lewis	1922	Horse serum.	−57·40°
Lewis	1922	Normal human serum (small amount $(NH_4)_2SO_4$).	−50·58° to −54·83°
Young	1922	Crystalline horse serum.	−62·83°

van Slykes's method of analysis to differentiate between the protein excreted in amyloid disease and in Bright's disease. At first sight the values reported, as is evident from Table VII., would seem to fit in

TABLE VII.

—	Urinary protein from—		Serum or lacto-globulin	Serum-albumin	Lact-albumin
	Bright's disease	Amyloid disease			
NH_2 nitrogen ..	7·79	8·78	7·77	5·8	7·93
Melanin nitrogen ..	2·72	3·19	2·14	1·1	1·82
Total N_2 of bases ..	*30·27*	*28·0*	*26·12*	*36·9*	*26·72*
Cystine N_2	0·08	0·33	1·87	3·5	2·18
Arginine N_2 ..	11·72	10·77	10·96	10·4	7·56
Histidine N_2 ..	4·15	4·78	4·47	6·7	4·44
Lysine N_2	14·32	12·12	8·82	16·3	12·54
Total N_2 of filtrate ..	*60·34*	*61·42*	*63·10*	*56·5*	*62·49*
Amino N_2 of filtrate	58·40	60·63	61·65	54·2	59·84
Non-amino N_2 ..	1·94	0·79	1·45	2·3	2·65
Total	*101·12*	*101·39*	*99·13*	*100·3*	*98·96*

with the protein excreted in both conditions being a mixture of serum albumin and serum globulin; but the values obtained for the cystine fraction not only differ widely in the two conditions (being four times as great in amyloid disease as in Bright's), but also amount to only a very small fraction of the cystine present in the blood proteins. It is difficult to reconcile this result with the close agreement of the optical activity of normal human serum albumin and of the urinary albumin excreted in the cases of albuminuria of pregnancy, chronic nephritis, and orthostatic albuminuria examined by the writer. Consequently, until further investigations of this type have been carried out on "purified" urinary proteins, it seems preferable to regard the albumin in these conditions as probably serum albumin. On the other hand, the urinary albumin in more than 50 per cent. of the cases of "eclampsia" investigated by the author is probably different from serum albumin, as in this "low optical" group the mean value for the specific rotation of the albumin present was found to be −38·5°. It would seem a significant fact that while in no case of proteinuria uncomplicated by pregnancy nor in "albuminuria of pregnancy" *without* convulsions has an abnormally low specific rotation for the urinary albumin been observed, in a large percentage of the eclamptic cases the albumin excreted in the urine is considerably less lævo-rotatory than serum albumin. Experiments have been in progress to determine the nature of this low optically active urinary albumin, but owing to the difficulty of obtaining material suitable for such investigation, so far no definite conclusion has been come to and further work will be necessary. The value of the specific rotation, however, suggests that the albumin may be lactalbumin. As far as the author is aware, no record exists of the specific rotation of human lactalbumin, but it probably does not differ widely from that of cow's lactalbumin, for which Sebelien (1885) quotes −36·4° to −36·98°. This value is a little lower than the more recent figure—namely, −41·23°, given by Piettre (1924). The latter agrees closely with that recorded in the experimental part of this paper (−41·17°). Though, as the result of biological tests, such as those carried out by Hamburger (1901), Schlossmann and Moro (1903), and Bauer and Engel (1911), it seemed to be established that the serum proteins were identical with the corresponding milk proteins, it has now been shown that while serum globulin is chemically identical with lactoglobulin, lactalbumin and serum albumin are distinct chemical individuals (Hartley (1914), Crowther and Raistrick (1916), and Woodman (1921)). This, as already indicated, is in agreement with the observed difference in the specific rotation of the two albumins.

Possible Significance of Lactalbumin in Relation to Eclampsia.

If, then, the suggestion that the "low optical" urinary albumin is lactalbumin be accepted, we have in certain cases of eclampsia an analogous condition to the lactosuria which not infrequently occurs in the later months of pregnancy or soon after labour. While corresponding to the symptomless albuminurias of pregnancy, there exists the fairly common glycosuria of pregnancy. However, while the presence of lactose in the blood and its excretion in the urine would do little or no harm to a patient, the presence in the blood-stream of lactalbumin, which must be regarded as a foreign protein, might entail grave danger. It may be that normally small amounts of lactalbumin find their way into the blood-stream during pregnancy, but that, as a rule, an immunity to this foreign protein is established. When this immunity is not established, or when a sudden release of a large amount of lactalbumin occurs corresponding to a "shock" dose of foreign protein, then eclampsia is the result. This view may suggest that eclampsia might be liable to occur in cases where a child dies at or soon after birth, or in cases where the mother for any reason does not breast-feed the child. No record of such an occurrence, however, is known to the author. If it be assumed not to occur, the fact is in perfect harmony with the theory suggested, for the mother in the majority, if not in all such cases, would be completely immunised against lactalbumin. Consequently, no eclampsia would ensue. The above view may also have a bearing in explaining the fact, now well established, that the incidence of eclampsia is much greater in primiparæ than in multiparæ.

The condition of eclampsia would thus be regarded as of the anaphylactic type, a view which has been strongly upheld by some workers, including Veit, Hofbauer, Roseman and Anderson, Gräfenburg and Lockmann, and also adversely criticised by others, amongst whom are Frank, and Heiman, and Zweifel, but, nevertheless, this view cannot altogether be ignored, for although Zweifel (1921) has stated that eclampsia cannot be considered as an anaphylactic reaction, that was only with respect to fœtal and placental proteins. Further, Levi (1922) has recently reported benefit produced by intramuscular injections of sterile milk in cases of pregnancy toxæmias including eclampsia.

A possible alternative explanation of the part played by lactalbumin is that in response to its introduction into the blood proteolytic enzymes would likely appear. By their action proteoses or other toxic decomposition products of the foreign protein would result, and unless the foreign protein and its hydrolysis products could be detoxicated by the liver or eliminated by the kidney rapidly enough, symptoms characteristic of eclampsia (or the pre-eclamptic state) would ensue. In this connexion it may be added that Hülse (1924) has presented evidence

to prove that the increased blood pressure in eclampsia is caused by peptone in the blood; while Esch (1912) and Franz (1912) found in the serum and urine of eclamptics substances resembling anaphylactic poisons in their action and presumably derived from proteolysis somewhere in the body.

As recent work (Woodman, 1921) has shown that lactalbumin, like caseinogen, must be synthesised by the mammary glands, these glands are implicated in the causation of eclampsia. This idea, however, is not new. Sellheim (1909) suggested that eclampsia might possibly be due to toxins elaborated in the mammary glands, and Kastle and Healy (1912) advanced the view that parturient paresis (milk fever) in cows is caused by the absorption of toxic substances produced in the formation of colostrum and that the condition bears some resemblance to human eclampsia. Gessner (1921) also, in criticising Hofbauer's views on eclampsia, has pointed out that it also occurs in young cattle.

Further, unlike the proteinuria of, say, acute nephritis, that occurring in pregnancy is usually very materially influenced by the amount of protein in the diet. This fact, taken along with the well-known practice amongst farmers that a diet rich in protein is best for a good milk-supply, and the recent observations by Adair (1925) on the influence of diet on lactation in the human subject, would tend to support the view that the mammary gland is an important factor in the causation of eclampsia. In all the cases of the "low optical" group (Table II.), in which the condition of the breasts is reported, they are stated to be practically inactive. This inactivity may be explained by the stimulus for milk production coming too early, perhaps as the result of over-activity of the corpus luteum (Swale Vincent, 1924; Wallis and Williams, 1922), and thereby bringing about eclampsia. It is well to remember, however, in this connexion the observation by Hartwell (1921) that certain protein dietaries apparently render milk poisonous and finally check its flow.

The experiments described in this communication are only of a preliminary nature, but owing to the comparative rarity of eclampsia and the consequent difficulty in obtaining suitable material for such investigations the results so far obtained are published. The author is well aware, however, that much further work will be required and a greater number of cases investigated before the suggestions offered in the foregoing pages can be accepted as established facts.

Summary.

1. Experimental evidence is submitted which shows that the protein excreted in the urine in various conditions is not always identical.

2. In the 12 cases investigated of "albuminuria of pregnancy" without convulsions the specific rotation of the urinary albumin averaged −55·81°, and thus agreed with that found for human serum albumin under similar treatment—namely, −54·47°.

3. A similar close agreement in specific rotation—namely, −54·27°—was found in five cases of proteinuria not associated with pregnancy.

4. On the other hand, the 14 cases of eclampsia investigated were sharply divided into two groups, one group of six having an average $[\alpha]_D$ of −56·37°, and the other group of eight having an average $[\alpha]_D$ of −38·5°.

5. The optical activity of the albumin in the former group agrees well with that of serum albumin (−54·47°), while that in the latter approximates closely to that of cow's lactalbumin (−41·17°).

6. Accordingly, it is suggested (*a*) that in certain types of eclampsia the urinary albumin may be mainly lactalbumin; (*b*) that eclampsia may be an anaphylactic reaction due to the circulation in the blood of this foreign protein; and (*c*) that the mammary gland may be an important factor in the causation of eclampsia.

In conclusion, the author wishes to express his thanks to the staff of the James Mackenzie Institute for Clinical Research for assistance in various directions; also to Dr. A. E. Chisholm, of the Royal Infirmary, Dundee, for supplying the majority of the specimens; and also to Prof. P. T. Herring, of St. Andrews University, for much encouragement and advice.

References.

Adair: Amer. Jour. Obstet. Gynaecol., 1925, ix., 1.
Bailey: Barker's Endocrinology and Metabolism, 1924, iv., 835.
Bauer and Engel: Biochem. Zeitschr., 1911, xxxi., 46.
Bence-Jones: Phil. Trans. Roy. Soc., 1848, Part I., 55.
Bramwell and Paton: Reports Lab. Roy. Coll. Phys., Edin., 1892, iv., 47.
Cavazzani: Wiener klin. Wochschr., 1921, xxxiv., 121.
Cloëtta: Arch. Path. u. Pharm., 1891, xlii., 453.
Crowther and Raistrick: Biochem. Jour., 1916, x., 434.
Dakin: Jour. Biol. Chem., 1912, xiii., 357.
Dakin and Dudley: Ibid., 1913, xv., 263.
Dudley and Woodman: Biochem. Jour., 1915, ix., 97.
Esch: Münch. med. Wochschr., 1912, lix., 461.
Franz: Ibid., 1912, lix., 1702.
Gessner: Zent. f. Gynäk., April 2nd, 1921.
Hamburger: Wiener klin. Wochschr., 1901, p. 1202.
Hammett: Barker's Endocrinology and Metabolism, 1924, ii., 656.
Hartley: Biochem. Jour., 1914, viii., 541.
Hartwell: Ibid., 1921, xv., 563.
Howe: Jour. Biol. Chem., 1921, xlix., 93.
Hülse: Zent. f. Gynäk., 1924, xlviii., 1179.
Ishiwara: Zeitsch. Immunitäts forsch. u. Exp. Therapie, 1923, xxxvii., 238.
Kastle and Healey: Jour. Infec. Dis., 1912, x., 226.
Kossel: Zeitsch. Physiol. Chem., 1912, lxxviii., 402.
Levi: Annali di Ostetricia e Ginecologia, Feb. 28th, 1922.
Lewis: Proc. Roy. Soc., 1922, xciii., B., 180.
Mandelbaum: Deutsch. Arch. f. klin. Med., 1919, cxxx., 331.
Medical Science, 1921, iv., 537.
van Noorden: Metabolism and Practical Medicine, 1907, ii., 468.
Paton: Brit. Med. Jour., 1890, ii., 197.
Piettre: Compt. Rend., 1924, clxxviii., 333.
Piettre and Vila: Bull. Soc. Chim. Biol., 1921, iii., 483.
Robertson: Physical Chemistry of the Proteins, 1918, Chap. XIV., p. 358.
Sammartino: Biochem. Zeitsch., 1922, cxxxiii., 85.
Schlossmann and Moro: Münch. med. Wochschr., 1903, xiv., 597.
Sebelien: Zeitschr. Physiol. Chem., 1885, ix., 445.
Sellheim: Zent. f. Gynäk., 1909, xxxiv., 1609.
Senator: Arch. Anat. u. Physiol. (Virchow), 1874, lx., 467.
Vincent: Barker's Endocrinology and Metabolism, 1924, ii., 567.
Wallis and Williams: THE LANCET, 1922, i., 784.
Woodman: Biochem. Jour., 1921, xv., 187.
Young: Proc. Roy. Soc., 1922, xciii., B., 15.
Zweifel: Zeitsch. f. Immunitäts forsch., 1921, xxxi., 22.

A CASE OF ABDOMINAL LYMPHADENOMA.

BY L. R. SHORE, M.B. CAMB., M.R.C.P. LOND.,
ASSISTANT PHYSICIAN, ROYAL HOSPITAL FOR DISEASES OF THE CHEST, LONDON;

AND

W. A. YOUNG, B.SC., M.B., B.S. LOND.,
PATHOLOGIST TO THE HOSPITAL.

THIS case is recorded on account of the unusual features presented as regards diagnosis, distribution of the lesions, and mode of death.

A female, aged 26, was admitted to the Royal Hospital for Diseases of the Chest on August 5th, 1924, from the Willesden General Hospital, whence, having been observed to be febrile and to lose weight, she was transferred for observation as to her chest.

She had suffered for about a year from pain in the right thigh and leg, in the sacral region, and occasionally in the left thigh. She also complained that some curvature of the back had developed.

Condition on Admission.—The patient was thin and pale. Temp., 102·8° F.; pulse, 144; resp., 22. Mucous membranes were of good colour, no cyanosis or jaundice, there were some small deep ulcers on the face. Tongue red and glazed; no glandular enlargement in the neck. Pulse regular, blood pressure 100 mm. Hg systolic and 75 diastolic. Heart and lungs presented no abnormal physical signs. The abdomen was rigid and difficult to palpate, particularly in the upper part. A few hard glands in the right groin. A definite kyphosis of the lower dorsal and lumbar region was present with rigidity, but no redness or tenderness. No sensory changes in lower limbs or trunk; nothing significant in reflexes. Urine, sp. gr. 1010, acid, contained trace of albumin but no sugar. There had been amenorrhœa for 12 months. The findings did not suggest disease of the chest or central nervous system. The patient was quite definite that the spinal deformity was of recent (within six months) development.

Course and Progress.—Temperature fluctuated between 98° and 101°; pulse-rate varied from 144 on admission to 92; respiratory-rate from 20 to 26.

Blood Count (August 9th, 1924): Hæmoglobin, 77 per cent.; red blood corpuscles, 4,600,000, some anisocytosis and polychromatophilia. White blood corpuscles, 23,000 with differential count: Polymorphs, 91 per cent. (20,930 per c.mm.); small lymphocytes, large lymphocytes, and large hyaline, each 3 per cent. (690 per c.mm.); eosinophiles and basophiles, 0.

Urine.—No casts. On culture *B. coli*, *B. proteus*, and an organism resembling a fæcal streptococcus were recovered. There were occasional attacks of severe pain down the back of the thighs.

Pelvic Examination revealed no abnormality. A swab taken from the cervix uteri showed pus cells with a streptococcus as the prevailing organism.

X Ray Examination of the Spine by Dr. C. Gouldesbrough showed abnormalities of ninth and eleventh dorsal and fourth lumbar vertebræ, which were wedge-shaped. "The outlines of the vertebræ are very regular and do not suggest tuberculous caries so much as mechanical pressure." Rarefaction of the body of eleventh dorsal was noted. On August 20th, 1924, the right side of the face was noted to be puffy. Albumin was present in the urine in small quantity. On the 28th the face and ankles were definitely œdematous, and the urine showed increase of albumin. From the 31st the daily quantity of urine varied from 12 to 28 oz., and the albumin rose from ¼ parts per mille (Esbach) to 9 (Sept. 2nd), remaining afterwards fairly constant at that figure. Microscopical examination of urinary deposit showed pus cells and leucocytes—small epithelial cells and a few doubtful granular casts. Urea-concentration test indicated a definite urea retention. On Sept. 13th hyaline and coarsely granular casts were found with some pus and epithelial cells. The abdominal condition remained much as before, the liver was felt and was apparently tender.

The condition was provisionally diagnosed as amyloid disease, supervening on a chronic streptococcal infection of the vertebral column, or alternatively neoplasm of the vertebral column. The œdema continued, vomiting, dyspnœa, and headaches supervened, and the patient died in coma Sept. 21st, 1924.

By the courtesy of Dr. Vickery, resident medical officer of Willesden General Hospital, we learned that while there the temperature ranged from 98° to 100° with occasional evening rise to 101°. There had been no albuminuria.

Post-mortem Appearances.

External Appearance.—Generalised œdema, marked abdominal distension, several small facial ulcers, no palpable enlargement of glands.

On Section.—1. Thorax: About 2 pints clear brownish fluid in each pleural cavity; lungs showed very marked collapse; no pleurisy or pleural scarring. On section lungs contained no excess of blood or any œdema fluid; there was a purulent exudate in bronchi. Heart: Small excess of clear pericardial fluid, very slight roughening of pericardium over left ventricle; valves competent; muscle poor. 2. The abdomen contained about three pints of yellowish-brown fluid containing a few flakes of fibrin. Some cheesy fibrinous exudate over the pelvic floor; no inflammation of uterus and adnexa. The liver showed a large nodular, pale yellowish area on its anterior surface, and was generally enlarged, extending well below (2 inches) the costal margin. On section this pale area, which was about 3 inches in diameter and irregular in outline (with small outlying area), extending deeply into liver, and resembled a malignant tumour. The spleen of normal size or rather smaller. On section was a typical "sago-grain" spleen, the grains of considerable size, and the intervening tissue dark purple (iodine test negative). The kidneys were of medium size and of extreme pallor, in colour slightly yellowish-grey. They stripped with some difficulty. On section this pallor was still more noticeable, the colour being grey-white with some yellowish streaks in the medullary region. Iodine test negative. The pancreas was large and unusually tough. Lymphatic system: All lumbar and sacral glands were densely matted together and to surrounding structures, exceedingly tough and hard, but only moderately enlarged. The matting appeared to be of the nature of a chronic inflammatory fibrosis rather than malignant extension, the great veins being attached to, but not infiltrated by, the glands. Some glands were firmly fixed to the anterior ligaments of the lumbar spine in the same way. No other gland groups appeared to be affected. Spinal column: The eleventh dorsal vertebra was about half the thickness of adjacent vertebræ. The discs showed no abnormality, but the body of the vertebra was soft and pulpy. Adjacent vertebræ were not affected, but the body of the second lumbar vertebra was also found to be soft to the knife. (The eleventh dorsal vertebra was removed for section.)

Histology.

Examination of sections from the lumbo-sacral glands, the spleen, and the deposits in the liver and bone show the characteristic picture of lymphadenoma of the acute type ("malignant type" of some authors). At the growing edge of the deposits in the liver the granuloma showed most clearly the varied nature of its cells, many endothelioid cells with some giant endothelioid cells containing one to three large irregular hyperchromatic nuclei, reticular cells, a few small lymphocytes, fairly numerous eosinophiles, and some plasma-cells. The spread in the liver was primarily from Glisson's capsule along the inter-lobular connective tissue, and then by direct extension into the lobules themselves. At the edge of the granulomatous areas the liver cells showed shrinkage and degeneration, and marked increase of the supporting and endothelial cells and deposition of pigment. In the walls of a few of the capillaries small amyloid deposits were found.

A similar appearance was found in the more outlying glands of the lumbo-sacral group (apparently those most recently infiltrated). But in the more central glands of the group, which were densely matted together, considerable fibrosis had taken place. Sections of the spleen showed enormous increase of reticular structures, generalised fibrosis, and collagen deposition. In the fibrous tissue a few endothelioid cells were present, and in the less fibrous areas the typical cells of the granuloma were found. Areas of pigmentation and some small amyloid deposits in relation to capillaries and fibrosed Malpighian corpuscles were also observed.

Sections of the body of the eleventh dorsal vertebra show considerable bone destruction, although few active osteoclasts were seen. The bone and marrow appear to be largely displaced by a scantily cellular tissue with a few areas of lymphocytic infiltration containing some endothelial cells, reticular cells, and "giant cells" (the latter quite distinct from the multinucleate cells of the marrow). The nature of the granulomatous infiltration was less obvious here than elsewhere.

Sections of the kidney show advanced amyloid degeneration of the walls of the glomerular capillaries and of the capillaries running parallel with the pyramidal tubules. The kidney shows also granular and cloudy changes in the tubular epithelium and a considerable increase of inter-tubular connective tissue, partly fibrous in nature but rather more cellular than the interstitial tissue of chronic interstitial nephritis. This tissue showed early endothelial hyperplasia and may possibly represent an early infiltration similar to that found in the liver.

Conclusions.

Diagnosis by examination of an excised gland is not available in the "abdominal form" of Hodgkin's disease because only deep lymphatic glands are affected. In this case the clinical picture was obscured by a polyleucocytosis (probably of secondary origin), radiological appearances and postural changes of an uncommon nature, and the late onset of renal amyloidosis. Bony infiltration and amyloidosis are both recognised sequelæ of Hodgkin's disease, although comparatively uncommon.

DONCASTER INFIRMARY.—It is proposed to build a new infirmary at a cost of £300,000. The existing buildings, which contain 65 beds, have been twice enlarged in the last 20 years, but are still so inadequate that many patients have to be sent to Sheffield, Leeds, Hull, and Nottingham. When the infirmary was established in 1792 the population of this area was 15,000; it is now nearly 200,000. The miners and railway men, who form 80 per cent. of the working population, together with the glass-workers, have submitted to a weekly deduction from their wages towards a building fund, and their payments amount to £12,000 a year.

SHEFFIELD HOSPITAL SITE.—Sheffield recently has been fortunate in securing Norton Park as its future hospital site. This park, situated in an elevated position well above the city, is 120 acres in extent, and within 12 minutes ambulance service of the city centre. The value to the hospitals of this site has been considerably enhanced by the generous gift from Councillor and Mrs. J. G. Graves, of Sheffield, of the remaining 154 acres of adjacent land and wooded estate, making an open space of 274 acres, thus safeguarding for all time the future voluntary hospitals of Sheffield from any proximity to industrial and residential buildings.

Clinical and Laboratory Notes.

A NOTE ON THE GLOBULIN AND COLLOIDAL GOLD REACTIONS OF THE CEREBRO-SPINAL FLUID

AFTER THE MALARIAL TREATMENT OF GENERAL PARALYSIS OF THE INSANE.

BY J. ERNEST NICOLE, L.M.S.S.A. LOND.,
SENIOR ASSISTANT MEDICAL OFFICER, LANCASHIRE COUNTY MENTAL HOSPITAL, WINWICK;

AND

JOHN P. STEEL, M.B., CH.B. EDIN.,
ASSISTANT MEDICAL OFFICER TO THE HOSPITAL.

DURING the observation of 80 cases of general paralysis treated with therapeutic malaria, it has been found expedient to re-examine the cerebro-spinal fluid in 25 cases at varying dates after the termination of the pyrexia. Although recent observers, including McAlister [1] and Houston and Armstrong,[2] have stated that little or no alteration in the reactions of the cerebro-spinal fluids is to be seen, our findings hardly seem to support their views, at least in so far as the globulin and colloidal gold tests are concerned.

From the results we quote below it will be seen that more than half the cases mentioned now show a negative reaction to the globulin test, whereas all showed a positive result before treatment.

As regards the colloidal gold reaction, even allowing for the human element in taking the readings, the changes more or less correspond in their occurrence with the conversion of a positive globulin reaction into a negative one; furthermore, the change has not only been the "displacement to the left and upwards" mentioned by Pappenheim, but is also of the nature of a conversion of a true paretic reading to that more usually associated with a diagnosis of cerebro-spinal syphilis. (Table I.)

TABLE I.

Case.	Before treatment.		Period since treatment.	After treatment.	
	Coll. gold.	Glob.		Coll. gold.	Glob.
1	5555554321	Pos.	16 months.	4555544300	Pos. weak.
2	5555310000	,,	18 ,,	0144432100	Neg.
3	5555555532	,,	22 ,,	2345554300	,,
4	5555542222	,,	19 ,,	1155553100	Pos.
5	5555554310	,,	4 ,,	2555543000	,,
6	5555421100	,,	8 ,,	2444433211	Pos. weak.
7	5555554321	,,	21 ,,	0234331000	Neg.
8	5555543210	,,	11 ,,	1333321100	,,
9	5555532000	,,	17 ,,	0123432200	,,
10	5555533110	,,	12 ,,	0123322300	,,
11	5555521000	,,	16 ,,	0133332100	,,
12	5555542100	,,	33 ,,	5555554420	Pos.
13	5555431000	,,	11 ,,	0112332100	Neg.
14	5555551100	,,	14 ,,	0023321100	,,
15	5555555410	,,	15 ,,	0155432000	,,
16	5555542100	,,	16 ,,	0124432200	,,
17	5555322100	,,	16 ,,	3335444300	,,
18	5555541000	,,	15 ,,	0123443100	,,
19	4555543300	,,	12 ,,	0255544321	Pos.
20	5555554100	,,	15 ,,	4555553311	,,
21	5555555543	,,	13 ,,	0125543300	Neg.
22	1125555510	,,	14 ,,	5555544300	Pos. weak.
23	4555555443	,,	13 ,,	4555544300	Pos.
24	5555555430	,,	7 ,,	5555555432	,,
25	5555554200	,,	6 ,,	4555553220	,,

It must be pointed out, however, that changes in the globulin and colloidal gold reactions do not necessarily correspond with the presence or absence of definite clinical improvement. (Table II.)

[1] W. M. McAlister: Journal of Mental Science, January, 1924, and April, 1925.
[2] T. Houston and E. Armstrong: Ibid., October, 1924.

TABLE II.

Reaction.	Physical condition.		Mental condition.	
	Improved.	Not improved.	Improved.	Not improved.
Altered	8	6	5	9
Not altered ..	7	4	6	5

Of the ten cases shown as not physically improved it should be pointed out that six were admitted in fair health and are still in that condition.

Although we do not attempt to draw any conclusions from our findings, it may be of interest to note that of those cases admitted in an advanced condition of general paralysis (showing progressive dementia and faulty habits coupled with physical debility), out of a total of 12, 8 have shown no appreciable alteration in the reactions of the cerebro-spinal fluid after treatment with malaria. On the other hand, out of the 13 early cases, 10 have shown definite changes in these respects.

We are indebted to our medical superintendent, Dr. F. M. Rodgers, for permission to report our findings.

TRAUMATIC LESION OF THE CAUDA EQUINA; LAMINECTOMY; RECOVERY.

BY E. ROCK CARLING, F.R.C.S. ENG.,
SURGEON TO WESTMINSTER HOSPITAL;

AND

HILDRED CARLILL, M.D. CAMB., M.R.C.P. LOND.,
PHYSICIAN TO THE HOSPITAL.

THIS case of injury to the cauda equina presents several features of interest that render its record desirable.

The patient, a stone-mason, aged 45, fell 40 feet to the ground in a scaffold accident on Sept. 3rd, 1924. He was admitted at once. In addition to severe shock he had extensive contusions over the lower ribs and in the lumbar region, and he had a Pott's fracture on the left side and some fractured metatarsals on the right side. The abdomen rapidly became distended and tender, and there was vomiting and hiccup. The lumbar spinous processes appeared to be somewhat irregular and the power of the lower limbs impaired, but an exact investigation was rendered difficult by reason of the fractures.

The following day the man had retention of urine and complained of severe lumbar pain, and on Sept. 5th there was loss of control of both urine and faeces. On the 6th the lumbar cerebro-spinal fluid was found to be intimately mixed with blood.

Examination on the 7th showed weakness of the lower limbs but no palsy at any joint and no abnormality of cutaneous sensibility. Tuning-fork vibrations were correctly perceived. The knee-jerks were normal, the ankle-jerks were abolished, the calf-jerks were normal. The epigastric and abdominal reflexes were all normal. On the 10th there was paresis of the lower limbs. The knee-jerks were exaggerated equally and both ankle-jerks remained abolished. The abdominal reflexes were all healthy, but the plantar responses and the superficial anal and bulbo-cavernosus reflexes were found to be all absent. Erections had not occurred since the accident. Sensibility to every variety of stimulus was normal throughout. The lumbar cerebro-spinal fluid contained still a little blood. A lesion of the cauda equina, below the second lumbar segment, was diagnosed and a radiogram showed a fracture of the first and second lumbar vertebræ.

Laminectomy was performed on Sept. 11th and disclosed much extra-thecal blood clot. Within the theca there was no blood clot and the cord, which did not pulsate, appeared to be otherwise unaffected. A catheter was passed freely upwards and downwards within the theca. The bony canal was diminished in its antero-posterior diameter at the site of the fractures by a posterior displacement of the bodies of the last two dorsal and first lumbar vertebræ. The pressure on the cord had been exerted, so far as could be ascertained, opposite the second and third lumbar segments, causing it to be bruised on its anterior aspect. Not until

the firm, partly organised, decolorised extra-dural clot had been completely removed did the cord pulsate.

Two days after the operation the man complained of tingling and shooting pains in the lower limbs. There was already some return of power in the legs and by Sept. 24th they were still stronger. On Oct. 1st the ankle-jerks were still abolished. During the first week of October convalescence was interrupted by bronchitis and slight mental derangement. He improved after phlebotomy. On the 8th he passed urine naturally for the first time since the accident, and by the 14th there was still further improvement in this respect and in his general condition. On the 20th the ankle-jerks were elicited and on the 23rd he was allowed out of bed. He walked for the first time on Nov. 10th, and he now had fair control of both sphincters. This control was almost complete by Dec. 5th, and on the 8th he was walking normally on the level and on stairs and without pain. The bulbo-cavernosus reflex was now present on the left side, absent on the right. The superficial anal reflex was absent. Erections had not returned. He was discharged on Dec. 8th, 1924, on the eighty-ninth day after operation.

He was again seen on June 13th, 1925. Apart from total impotence, slight delay in commencing micturition and the occasional leaking of a little urine at the end of the act, and some precipitancy of defæcation, he was well, but he complained of a little pain in the lower spine. Knee- and ankle-jerks were healthy. The epigastric, abdominal, cremasteric and plantar reflexes were all normal. The bulbo-cavernosus reflex on each side was normal and the superficial anal reflex had recovered its activity.

INTESTINAL HÆMORRHAGE CONTROLLED BY COAGULEN (CIBA)

DURING A SEVERE ATTACK OF TYPHOID FEVER.

BY L. C. DUNDAS IRVINE, M.R.C.S. ENG.,
SURGEON LIEUT.-COMMANDER, R.N.V.R.

THE knowledge of an easily administered and reliable styptic is a great mental comfort in emergency, so I am placing on record an instance of the successful use of coagulen (Ciba) in a case of typhoid with intestinal hæmorrhage. Coagulen (Ciba) is the name given to a preparation of fibrin ferment, the properties of which were established [1] by Dr. Fonio in Kocher's clinic in Berne. It is now marketed by the Clayton Aniline Co., and its rapid action in two striking cases, one of tonsillar hæmorrhage, the other of hæmoptysis, has been recently recorded.[2] In the following case the drug was instrumental in saving the patient's life.

E. L. C., aged 19, contracted typhoid on the continent of Europe early in July, 1925, and the case came under my care on July 24th. It was a severe attack, characterised, as also in her sister, who simultaneously contracted the disease, by the high initial temperatures. On August 2nd the temperature, which had dropped after much struggling from the region of 105° to 103° F., shot up again to 105° and a sharp hæmorrhage made itself evident. A dose of 1·5 c.cm. of coagulen (Ciba) was given intramuscularly and repeated four hours later. Though a large quantity of altered blood and blood-clot was evacuated during the next two days there was no more fresh bleeding. On August 17th there was another hæmorrhage, even more severe than the first, without the rise in temperature that had announced the former. Two more intramuscular injections of 1·5 c.cm. at four-hourly intervals were given and again the bleeding ceased and was no more repeated. A careful watch has been kept ever since for any signs of venous thrombosis, but there has been none, and the patient's convalescence has progressed far enough now, though she is still in bed, to justify the hope that that tiresome complication will not manifest itself.

I have used coagulen (Ciba) in a fair number of cases of hæmorrhage from various causes without it once failing me, and it is satisfactory to record its successful use in a patient desperately ill without any unpleasant after-effects or reaction.

[1] THE LANCET, 1914, ii., 173.
[2] THE LANCET, 1925, i., 176 and 1238.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF SURGERY.

THE TEACHING AND PRACTICE OF SURGERY.

THE first meeting of this Section for the session was held on Oct. 21st, when Sir LENTHAL CHEATLE, the new President, delivered an address on the Present State of the Teaching and Practice of Surgery. He divided his subject into three main portions—research, specialties, and treatment.

Research.

Concerning research, he said that he had an intimate talk during last year with a surgeon from the provinces, who remarked that provincial surgeons no longer looked towards the surgeons of London for new notions or leadership, and the reason given was that little or no original research was being done by the London men. Perhaps, Sir Lenthal Cheatle said, all surgeons had had some such thoughts themselves. Taking the first allegation, that London was losing its surgical leadership because it had few men engaged in research work, that must be due to the fact that, in these days, mere technical ability was not enough to maintain leadership or to regain the lost ascendancy. He who was only a so-called clinical surgeon had lost his position as leader in his profession; he could add very little to knowledge, and could himself acquire little more except added skill in technique. Indeed, without research work there was not much encouragement for him to think at all, and so he had a limited outlook. Every surgeon should conduct some research, however little, in association with his actual operating. As a rule, a man could find time for the things he really wanted to do. He had advised students to start original investigation by cutting at different edges wounds of the skin which had healed by first intention. By studying intently some such subject for six months a student would know more than anyone in his year on that subject. If such a man, in the course of his study, came across such a statement as that malignant ulcers of the stomach commonly arose from simple ulcers, he would not accept it as a fact, but would seek to test the statements on which such a belief was founded. He would then find that ulcers excised under the idea that they were simple were really extensively carcinomatous, and that ulcers reported upon as early carcinomata were simple ulcerations in which epithelium was dislocated. There was no pathological evidence that malignant ulcer of the stomach was a complication of a previously simple one. Research work perfected a man's data and led others to perfect theirs; it also kept the mind young, and supplied a constant inspiration, as well as supplying facts and notions not to be found in books. An instance of this was the research of Prof. C. L. Bagg, of New York, who took a healthy strain of mice and mated them, and immediately on the birth of the litters separated them from their mothers so that they could not suckle, then re-mated those mothers, and their next litter was treated in the same way; 87 per cent. of those mothers developed fulminating carcinoma of the breast, and the same result followed ligation of the mammary ducts on one side (the litter being allowed to suckle from the other side), the carcinoma appearing in the ligated breasts. He thought the experiment may have proved that there was another factor essential to the organism than Gye's specific factor—namely, the preparation of the epithelial cell—or it might be that the specific factor had been made more active. He said he considered the term research covered any means by which one strove to add to knowledge of the cause, prevention, and treatment of disease, and he urged, as he had done on former occasions, a much closer collaboration between the clinician and the specialist. The great hope for the future lay in the encouragement

of research by the unit system of teaching. Money could not subsidise genius, but he thought it would create a body of men more capable of leading in their profession than any who had existed in the past, and, in due course, genius would come along. The surgeon should always have a skilled assistant available; at present his assistant became skilled when he was due to leave, and a novice took his place, and the same process was repeated. Yet a skilled assistant meant halving the time of an operation and lowering the mortality. The director of a teaching unit should be allowed to have private practice; it would render him a more human and tactful soul, make him a better teacher and operator, and give him a better conception of a surgeon's duties.

Specialties.

Dealing next with specialties, the President said that a further cause of the atrophic state of surgery was the breaking up of this practice into various and completely unnecessary specialties—a system wrong in principle and profoundly wrong in practice. Nature did not specialise, and specialists often lost sight of great guiding principles. The problems of infection, tumour formation, and biochemical changes concerned all parts of the body, and exclusive attention to a small part of the body precluded attention to other tissues as well, unless several specialists acted in conjunction. Already the rigid confines of specialties were being broken down; modern gynæcologists operated on everything connected with the female, except a cerebral lesion, and the laryngologist was now including in his purview extralaryngeal conditions such as goitre, carcinoma of the tongue, and glands of the neck. He would like a means to be discovered whereby this separation of the specialties might be stopped, and he would be glad to see new facts and interests propounded to the whole of the Royal Society of Medicine, whoever the specialists might be who could bring such facts forward.

Treatment.

His last heading, Sir Lenthal Cheatle divided into qualified and unqualified. With regard to qualified practice, he said there was a great and increasing demand on the part of the public for surgical aid near at hand, especially for acute cases, while the body of patients suffering from surgical disorders which were not acute was so enormous that it could not be dealt with in the great centres. Hence large suburban hospitals had been built, and these were staffed by surgeons of first-rate calibre, and they could no longer be regarded mainly as nurseries for men whose ambition was to become attached to the staff of their teaching hospital and school. The men at the outer hospitals must be competing with the teachers and practitioners in the centre. The old system, he said, was really obsolete, and unfortunately the "old" system was the present one. The kudos attaching to a surgeon on the teaching staff, considerable at one time, was now insignificant. The idea seemed to be, "If you teach our students, you shall not run a private practice." It was the younger teachers who were feeling the effects of the decentralisation. And if the best men were prevented from teaching, what would become of efficient teaching? The demand for efficient teachers could only be met by offering high salaries. The problem could only be solved by Parliamentary action, by a controlling Ministry of Health which must be quite free from political fetters; he was not referring to a body such as the present Ministry, which was so hampered by political lumber that it had little or no time to devote to the problems of public health. The headship of it should not be a prize bestowed on a politician for services to his party.

His own views on unqualified practice, he said, were well expressed in the recent presidential address of Sir Holburt Waring to the Medical Society of London, but the condition of affairs revealed in the discussion on that address could not have occurred if a carefully selected doctor had been head of the Ministry of Health.

Prof. C. C. CHOYCE proposed and Prof. C. A. PANNETT seconded a cordial vote of thanks to the President for his address, both expressing general agreement with its main theme.

SECTION OF EPIDEMIOLOGY AND STATE MEDICINE.

A MEETING of this Section was held on Oct. 23rd, Dr. J. MCVAIL, the President, being in the chair.

Dr. T. STACEY WILSON opened a discussion on the management and treatment of

Scarlatinal Epidemics in Boarding Schools.

He said that his 25 years' experience in the Royal Institution for Deaf and Dumb Children at Edgbaston led him to class the difficulties of recognition under two heads: (1) Where the patient had only very slight initial symptoms, and (2) where he had no initial symptoms at all, desquamation being the first sign of the illness. Both classes were highly contagious. A child might show nothing but an attack of vomiting or slight pyrexia and yet infect everyone with whom he came in contact. The epidemic was very persistent and would run on for three months in spite of every effort to stop it. It was not always possible to isolate incipient cases, for the only symptom might be a slight flush on the skin of the thigh. This flush might spread or alter its position from day to day or might be gone altogether in 12 hours. The patient was fairly certain to show peeling after a fortnight or so. Although it was not generally accepted, his experience amply proved that many patients showed no symptoms at all before desquamation. In an epidemic that had broken out in the middle of the term he inspected the hands and feet of all the children and found a girl with typical desquamation but no symptoms whatever. He suspected her of being the original cause of the outbreak and one child infected by her died. He had sent 30 or 40 such cases to the fever hospital in the course of 25 years. The difficulties of diagnosis were illustrated by his experience on one occasion when he isolated six or eight children with typical scarlatinal roughness of the hands and feet, and a few more with roughness that he thought was not scarlatinal; of the suspects not one broke out but two or three of the others did. When he said that some cases had no rash at all he admitted the possibility that there had been a rash too slight to attract notice, but since noticeable rash was always attended by symptoms such as sore throat, pyrexia, and a fever-tongue, he thought it legitimate to infer that when these symptoms were not present there was no rash. These patients with no symptoms constituted the chief difficulty in managing the epidemic.

Types of Desquamation.

The disease was often so mild that it only caused exfoliation where the skin was very thin, as between the toes or on the division between the hard and soft skin of the feet and hands. Even in these places the friction of clothes, &c., was likely to destroy the evidence. Since the feet of many people were in a constant state of desquamation diagnosis could not depend entirely on this sign. The true eruption was punctiform, the epidermis broke over small areas, an eighth to a twelfth of an inch in diameter, making small rings or blisters which expanded and became irregular and ragged at the edge. The presence of two or three of these rings was strong evidence of scarlatina. It was important to remember that where skin had become sodden through washing circular breaks might appear in normal people. If these did not increase in size they were not scarlatinal. The appearance of fresh circles between the toes on successive days was fairly good evidence of the disease. Sometimes these eruptions were only visible immediately after washing the feet, and were often

so evanescent that only a weekly examination would detect them. If 160 children were examined simultaneously many would have to sit about with wet feet for 20 minutes, which was apt to produce the spurious desquamation described above. Some children became known in time for a chronic spurious desquamation, the rings of which did not increase in size. The edges of the scarlatinal rings did not get dirty but always showed a border of white. (He then showed a most interesting series of photographs prepared with great care by one of the assistant masters which illustrated several types of true and spurious desquamation.)

Discussion.

Dr. E. W. GOODALL remarked that, for purposes of observation, an institution such as that in which Dr. Stacey Wilson had gained his experience had the advantage over a fever hospital that the population was fixed, while that of the hospital was constantly shifting, and no patient could be watched continuously for months, or even for weeks. It was true that scarlet fever had long been known to occur without a rash, and he admitted that it was much the most difficult of the fevers to diagnose. He would far sooner have to diagnose a case of small-pox. Not a single symptom was characteristic and every one might occur in some other disease; diagnosis had to depend on a combination of symptoms. Some of the severest cases had no rash and were only detected after they had caused an outbreak of scarlatina in a diphtheria ward. Desquamation might be caused by the pressure of the bed or the clothes. In spite of what Dr. Stacey Wilson had said, he maintained that there was no typical desquamation in scarlatina. He had once thought that the pinhole form was typical, but had since seen it in an enema rash, an antitoxin rash, rubella, measles, and even in a rash caused by rubbing with camphorated oil. The disease might even occur without any desquamation; the more brilliant the rash the more liberal the peeling. The strawberry tongue was far more a sign of measles than of scarlatina. So untrustworthy a sign was desquamation that no patient in the North-Western Hospital was ever placed in a scarlatina ward without a period of isolation. He had once admitted a case with liberal desquamation of exactly the scarlatinal type; the peeling was due to a scald some days old, but the patient contracted scarlatina in the ward and died. A true scarlatina case had developed acute nephritis three weeks after a slight rash had broken out, showing that the required period of isolation was sometimes very long. He remarked that Dr. Stacey Wilson's inspection, thorough though it was, did not seem to have cut short the epidemic. He also questioned very strongly whether desquamation was really infectious in itself. The infection was surely spread, not from the peeling skin, but from the mucous membranes of the throat and nose. The returned case-rate had not gone up since he began to send out large numbers of children still desquamating. Perhaps the Dick test and other new methods would help to cut short epidemics.

Dr. F. M. TURNER remarked that another cause of desquamation was sunburn, especially from intensive sunlight treatment. This caused an erythema followed by peeling very similar to that of scarlatina, so that it was well to inquire if a suspect had been undergoing light treatment. Peeling under the toes was far too general and unreliable to be a sign of scarlatina except to a very experienced observer. A desquamation exactly similar to that of scarlatina occurred occasionally in measles.

Dr. D. FORBES said that in school-children where daily inspection was not possible, it was very difficult to distinguish accidental desquamation from scarlatinal peeling, especially if the child were dirty. It was possible for true peeling to become so covered by dirt as to be indistinguishable from spurious. A child was not infectious when peeling unless the throat and nose showed positive signs of the disease.

Sir JOHN BROADBENT agreed that infection was spread from the throat and nose and not by desquamation. A peeling tongue was a valuable sign after the disappearance of the rash; this never occurred in measles. He described a throat carrier, a child who had had scarlet fever, with headache, vomiting, and sore throat, and who spent eight weeks in hospital, during which time she peeled. Ten days after discharge she went to stay with two old ladies, both of whom developed scarlet fever, one fatally. After a time in a convalescent home the child went home and infected her brother, although she had been perfectly well since she left hospital.

The Dick Test.

Perhaps the Dicks' cultures would help to detect scarlatina carriers as the Schick test detected diphtheria carriers. He had seen cases of bleaching rash detected by the Dick test. When the toxins and their doses had been properly standardised they would be invaluable in testing suspects. A positive reaction would show that the child had never had scarlatina.

Dr. R. A. O'BRIEN said that in his experience the Dick test was not as reliable as the Schick test. Theoretically, the Dick test should give a positive reaction during the first three days of the rash, but in England it had been found that only 70–90 per cent. gave it with 1/1000 toxin. The Dick test would be helpful, in a school like Dr. Stacey Wilson's, in isolating the right children. A child who gave a negative result was almost certain to be immune, though the evidence for this was not quite conclusive. It might be useful to know how soon in an infection a positive Dick reaction became negative. A hæmolytic streptococcus had been isolated from the throat of scarlatinal patients, and he was hopeful that some way of identifying this coccus would be found before long. Gordon's agglutination test for crusts in small-pox had proved of great value, but since scarlatinal skin was now known not to be infectious it was no use there. Possibly some agglutination test might be devised for sputum in scarlet fever.

Dr. S. MONCKTON COPEMAN said that the disease was much less severe now than when he was a boy. It was much more intense in New York than in this country. The best way of dealing with an outbreak was to carry out the Dick test and immunise susceptible children. A child who gave a negative reaction on admission with a doubtful rash had never caught bad scarlatina in the wards, therefore a Dick negative, although not quite so certain as a Schick, practically meant immunity. A child who gave a Dick negative was not infectious.

Dr. MAJOR GREENWOOD said that isolation measures had not been successful in diminishing the scarlatina incidence; the only hope lay in immunisation.

Dr. T. CARNWATH said that in Salford cases were discharged after four weeks, sometimes desquamating heavily, and the disease was no worse there than in Manchester where they were kept in six weeks. In Wallasey, where they were only kept three weeks, there were no more return-cases than in other towns. He mentioned a child who had been discharged five weeks and then caught a cold and immediately infected his three brothers. This suggested a latent virus in the throat, liberated by another infection.

Dr. G. C. TROTTER said that in Paisley they discharged cases after four weeks if they had no nasal or pharyngeal discharge, and had had fewer return-cases than when they kept them in longer. He had known a spurious desquamation caused by playing with lime. Second cases occurring in a family were often missed because there was no system in London by which the second case went to the same fever hospital.

The PRESIDENT, in concluding the discussion, said that the malignancy was worse in every way 50 years ago. Hospital isolation had not affected the incidence, but gave the children much better treatment and a better chance of recovery. Future control of the disease would depend on immunisation, but public apathy and dislike of these measures made the work difficult.

SOCIETY OF SUPERINTENDENTS OF TUBERCULOSIS INSTITUTIONS.

Diagnosis and Treatment of Pulmonary Tuberculosis.

AT a meeting of this Society, held on Oct. 19th, Dr. J. W. LINNELL related his experiences at the Victoria Park Hospital, National Hospital, Ventnor, Mount Vernon Hospital (under the late Sir James Mackenzie), London Hospital, and at St. George's Hospital, in coöperation with the late Dr. Arthur Latham. Any value there might be in his conclusions lay in the fact that time had placed them in their proper perspective. As regards general treatment, he considered graduated rest to be more efficacious than graduated labour, and strongly advocated absolute rest in bed for pyrexial cases, his motto being, "Let sleeping dogs lie." He described the tuberculin treatment as practised at Mount Vernon from 1909 onwards. These trials were made for about three and a half years, gradually increasing doses being given subcutaneously and orally, avoiding reaction. It was found that though tuberculin had beneficial effects in cases of tuberculous glands and eye conditions, much the same results were obtained by the injection of any foreign protein. At St. George's Hospital the Spahlinger treatment was tried on specially selected cases. In no pulmonary case did positive sputum become negative; there was no convincing evidence of improvement of lupus after three months' treatment. Surgical cases were equally disappointing. The healing of the ulcer occurred, but the intact nodules were unaffected. This would be noteworthy were it not equally well attained by the injection of either mixed-infection vaccines or peptones. He quoted a case where increasing doses of the latter were administered at weekly intervals to a boy suffering from extensive ulceration of the face and ankles with incredibly satisfactory results. He also referred to his experiences, and their unconvincing results, with mixed-infection vaccines, pneumosan, and intravenous injections of iodoform in ether. He expressed his further disillusionment with Dreyer's vaccine, aurocyanide, and sanocrysin, all of which he had investigated. In fact, he agreed with an eminent bacteriologist who had recently stated that nothing further could be expected from vaccine therapy. Artificial pneumothorax appealed to him as a logical procedure in specially selected cases. Speaking of diagnosis, he urged that all medical students should do "six weeks hard" at a chest hospital before their final examination, and that senior men working in special lines should keep in touch with general work by regular attendance at the out-patient department of a general hospital.

SALFORD ANALYST'S REPORT. — The Salford borough analyst, Mr. S. D. Elsdon, in his annual report for 1924, states that during the year 1700 samples have been submitted for analysis and of these 1544 were taken in connexion with the Sale of Food and Drugs Act, and 156 were submitted by various corporation departments. Of the 1544 samples, 66, or 4·3 per cent., were returned as adulterated, a figure considerably better than that for any year since 1919, when the proportion was 8·8. Of 833 samples of milk, 22, or 2·6 per cent., were returned as adulterated, which figures show that Salford's milk-supply compares not unfavourably with that sold in other districts. All samples of butter examined were found to be genuine, though 18 samples were preserved with boron preservative, equal to 0·3 per cent. as expressed as boric acid in each case. None of the margarine samples was adulterated. Of 55 samples of Cheshire cheese, 6, or 10·9 per cent., were returned as adulterated. Of sausages, in 15·4 per cent. boron preservatives in comparatively large amounts were found. An amount of boric acid which exceeds 2·5 per cent. is undesirable. Of drugs, 10 per cent. were adulterated, chiefly paregoric, turpentine, and almond oil—in the last peach kernel oil being substituted. Of 76 samples of dispensed medicine two were unsatisfactory. In one case the pharmacist was fined, there being a shortage of 20 per cent. of the correct quantity of potassium bromide.

Reviews and Notices of Books.

DENTAL INFECTIONS, ORAL AND SYSTEMIC.

By WESTON A. PRICE, D.D.S., M.S., F.A.C.D. Cleveland, Ohio: Penton Publishing Co. In two volumes. Vol. I., pp. 673; Vol. II., pp. 471.

THESE two volumes of over 1100 pages are devoted entirely to the subject of dental sepsis and its relationship to systemic disease. The book is by far the largest single contribution to this subject and undoubtedly the most important. Though there has been a steady output of literature on dental sepsis since attention was first focused on the subject by Dr. Hunter little more than 20 years ago, we are still far from a complete understanding of the nature of dental sepsis and its results in other parts of the body. Even these volumes, which in their wide scope and thoroughness go far beyond anything hitherto written, still leave the matter in considerable obscurity. They cover a wide field and it is difficult to appraise or even summarise them. Each chapter, or rather essay, discusses a definite problem which is stated at the beginning like a problem of Euclid, and is more or less complete in itself, ending with a brief summary of the evidence. The really remarkable feature of the book is the original investigations carried out by the author. Very many animal experiments have been performed to test the degree of infectivity of organisms from dental lesions under different conditions, and Dr. Price has reached many interesting conclusions. He points out the possible fallacy of judging the degree of dental infection by radiographs. The actual amount of bone-absorption may not be revealed, for it may be concealed by the shadow of the malar bone or hidden by another tooth, or obscured by a more superficial layer of condensing osteitis. He considers that the dental granuloma which so frequently occupies the rarefied apical areas shown in a radiograph, is a defensive membrane which protects the body against the local infection. The protection may sometimes be adequate for a long period. A large area of rarefaction at the end of a tooth may indicate a high defence, whilst an absence of local reaction may indicate a far more dangerous condition. Dr. Price finds that an infected tooth placed beneath the skin of a rabbit tends to become encapsuled and that the membrane round it is histologically indistinguishable from the dental granuloma. It must not be assumed that Dr. Price regards the radiographic evidence of rarefaction as being of negligible significance. What he suggests is that the condemnation of a tooth because of apical rarefaction may not always be necessary, and that the assumption, so often made, that all areas of apical rarefaction represent a serious menace to the general health which is roughly proportional to the degree of the absorption is incorrect. By correlating many factors it is possible within limits to determine the degree of defence of the individual to dental infection. Such infection lowers the ionic calcium of the blood, and the blood-sugar may also be increased. On the question of elective localisation Dr. Price is somewhat guarded, but he finds considerable evidence to support Rosenow's views.

In his second volume he treats of the clinical aspects of focal infection in its relation to diseases of the circulatory, alimentary, nervous, excretory, and other systems. The book is far from being the familiar monotonous record of amazing cures brought about by extraction of infected teeth; the number of cases dealt with is comparatively few, and each one is described in unusual detail. Thus, in a case of myocarditis, not only is the general and cardiac condition fully described, but the dental condition is gone into minutely. The result of inoculation into animals is given, as well as the results of a blood examination before and after dental treatment. This is the ideal method of investigating dental sepsis as

a possible cause of a systemic lesion. It is to be feared that it will never become the general method, but the completeness with which Dr. Price has investigated and recorded his cases has provided a most illuminating and helpful commentary. Some of the views put forward are novel and may be regarded as contentious until further investigation has been made; but the value of this book is beyond doubt, and it will probably long remain the fullest exposition of the subject of focal infection in the teeth and jaws—one which no serious student of the subject can afford to ignore. Unfortunately, the extreme length of these volumes may make them a closed book to many. Dr. Price's style is somewhat diffuse and a considerable compression might be effected without in any way impairing the value of the book. The production is admirable and there are nearly 500 illustrations of high technical excellence.

ABDOMINAL SURGERY.

The Early Diagnosis of the Acute Abdomen. Third edition. By ZACHARY COPE, B.A., M.D., M.S. Lond., F.R.C.S. Eng., Senior Surgeon to Outpatients, St. Mary's Hospital, Paddington; late Hunterian Professor and Arris and Gale Lecturer, Royal College of Surgeons of England. London: Humphrey Milford, Oxford University Press. 1925. Pp. 233. 10*s.* 6*d.*

THE fact that a third edition of this little book has been required so shortly after the two impressions of the second edition is proof of its popularity. The general principles of the new edition are the same and but few changes have been made.

The sections on acute pancreatitis and pneumococcal peritonitis have been rewritten, and one of the few errors in the last edition—the statement that the rigidity of the abdomen in cases of acute pancreatitis is more marked than with perforation of the stomach—does not appear. The clinical account of acute pancreatitis is well written and will be helpful to practitioners, but more stress might have been laid upon the fact that the disease occurs in several distinct clinical forms, and too much emphasis is laid upon the presence of a pancreatic tumour and of jaundice. But these are relatively small points. The book as a whole is clear and concise, with useful and practical diagrams.

Chirurgie der Niere und des Harnleiters. By Prof. Dr. J. ISRAEL and Dr. W. ISRAEL. Leipzig: Georg Thieme. 1925. Pp. 584. R.M.36.

THIS is a large book, but it would be difficult to dispense with any of its sections without detracting greatly from its value, for there is an absence of that overlapping all too common in big treatises. Surgical diseases of the kidneys are systematically described, and Prof. Israel gives his views on urological questions with the simplicity that comes from the conviction of truth. An enormous experience has evidently been drawn upon as is shown by the interesting clinical case-histories dispersed through the text. Due acknowledgment is given to workers in countries other than his own. The printing and the illustrations, a number of which are coloured, are excellent. Surgeons engaged in the study of urology will find much of interest in this book.

Pathogénie des Calculs Biliaires et Indications Opératoires. By THORKILD ROVSING, Professeur de Clinique Chirurgicale à l'Université de Copenhague. Paris: Masson et Cie. 1925. Pp. 125. Fr.20.

IN this book Prof. Rovsing is mainly concerned with the causation and treatment of gall-stones. Briefly stated, his conclusions are that they have their origin in the intra-hepatic bile canals and never arise as the result of infection. He thinks it probable that as a result of some transient toxic condition the metabolism of the liver is upset and inspissation of bile occurs; thick soft masses of "calcium bilihumin" are then passed into the gall-bladder, where they serve as nuclei for continuous accretions of cholesterol. The author believes infection to be always secondary to the presence of stones and never their cause. He adduces a wealth of data, both from his own experience and the work of others, but entirely omits to mention one very important piece of evidence in support of his theory, to wit, the almost universal presence of gall-stones—usually unaccompanied by symptoms and in the absence of infection—in cases of acholuric jaundice. Prof. Rovsing is a stalwart opponent of cholecystectomy as opposed to cholecystotomy—he has a disconcerting habit of referring to these operations as "tectomies" and "tomies," respectively—and produces data seeming to show that removal of the gall-sac is no safeguard against the recurrence of gall-stones, and, moreover, providing some grounds for belief that its extirpation may bring about disturbances in the general health. His views are in direct opposition to those of Naunyn, which have gained a wide acceptance: but this acceptance is not quite so general as Prof. Rovsing appears to think. Had Prof. Rovsing omitted polemics from his book, which he might have done with advantage, it would have been considerably shorter and easier to read.

BIO-CHEMISTRY.

Nature of Enzyme Action. Fifth edition. By Sir W. M. BAYLISS, M.A., D.Sc., F.R.S., late Professor of General Physiology, University College. London: Longmans, Green and Co. 1925. Pp. 200. 9*s.*

THIS was the first of a series of "Monographs on Bio-Chemistry," and when it appeared 15 years ago was not a little responsible for the immediate popularity and success of its companion volumes. The present edition was prepared prior to the author's last illness, and we learn from the preface that Sir William Bayliss's daughter completed the corrections after his death. No attempt has been made to add or to remove other than as he wished. It is unnecessary to repeat here what has been said before regarding the clarity of style, the breadth of vision, and the completeness of the material. The subject is treated on the broadest lines, and the detailed description of the properties of a large number of specific enzymes already known finds no place in this monograph, which confines itself to general properties more or less common to enzymes. The reader is given, therefore, a general idea of such properties of enzymes as their physical and chemical nature, methods of preparation, reversibility, mode of action, and so on. Perhaps in a future edition fuller accounts of oxidases and of the glutathione system might be added.

Physical Chemistry, its Bearing on Biology and Medicine. Third edition. By JAMES C. PHILIP, O.B.E., D.Sc., F.R.S., Professor of Physical Chemistry, Imperial College of Science and Technology, London. London: Edward Arnold and Co. 1925. Pp. 367. 8*s.* 6*d.*

THIS book is written with the object of providing the medical and general student with a brief outline of physical chemistry. In this new edition the author has included recent work upon hydrogen-ion concentration, plasmolysis, and permeability, otherwise the general scheme is the same, and in the 14 chapters the reader is taken over the subjects of gases, osmotic pressure, solutions, colloids, and mass action. The treatment is, in every case, clear and explicit; perhaps the best chapter is that on salt solutions, but the exposition of such confusing subjects as specific and equivalent conductivity is particularly lucid. Where all is so good we may yet regret the absence of what might be termed a thermo-dynamic background to the work. Deductions, such as Le Chatelier's theory and Gibb's surface-tension laws,

could then have been handled better. There is need for simple, non-mathematical treatment of these subjects, and Prof. Philip is evidently the person to give it. We shall look forward to a thermo-dynamic consideration in the next edition of this useful volume.

ELECTRO-THERAPY AND IONIC MEDICATION.

By HAROLD H. U. CROSS, Ph.D. Med., formerly Research Worker at the Stanford University, California. London: Charles Griffin and Co., Ltd. 1925. Pp. 253. 10*s.* 6*d.*

THIS book is chiefly devoted to the principles and practice of ionisation. Short introductory chapters have been added on high frequency, diathermy, and X rays, and there are also notes on the subject of muscle and nerve testing. The book concludes with a chapter on the electrical treatment of cancer.

The author gives full details for the treatment of suitable diseases by the introduction of ions, and describes some interesting experiments which he has conducted in order to show the migration of metal ions into jelly masses, the depth of penetration being shown by the X rays. His book is written in an interesting and attractive manner. Those who are beginning the study of electro-therapeutics will find a clear and encouraging exposition of the subject of ionic medication, and the experienced reader will find interesting accounts of the treatment of sinuses by a distinctly novel method, and of atony of the uterus by the combined faradic and galvanic currents. He will be surprised to read that the author has obtained good results in the treatment of trigeminal neuralgia by the unidirectional *pulsating* current. It is stated that when solutions for ionisation are being made rain-water or good tap-water can be used, but Dr. Cross insists on distilled water for treatment of wounds or ulcers. Certain statements are somewhat hard to understand—e.g., on p. 95, "The resistance of the tissues is due to their capacity for electro-chemical action more than to mere ohmic considerations." The account of muscle and nerve testing is too short to be of much value, and the definition of partial RD would not be accepted in this country. Nor would the statement on p. 106 that "in cases in which there is no reaction to either current the nerve is evidently divided and surgical interference is required" without qualification and amendment.

SANITATION SUPPLEMENTS OF THE TROPICAL DISEASES BULLETIN.

Supplement No. 2. July 30th, 1925. 3*s.* 6*d.*

THIS supplement contains a subtitle, Applied Hygiene in the Tropics, with the name of Lieut.-Colonel G. E. F. Stammers, R.A.M.C., attached. The supplement covers a very wide range in the headings, including disease prevention, water, food conservancy, small-pox, vaccination, disinfection, child welfare, medical inspection of schools, and industrial hygiene. There follows a section in which reports and vital statistics of various tropical regions are briefly abstracted, and in conclusion several reviews of books on more general subjects. A notice is attached to the Bulletin to say that this series of "Sanitation Supplements" will close with the third supplement, which is to appear on Oct. 30th, and will be replaced by a monthly "Bulletin of Hygiene," the first number of which will be published in January, 1926. This new Bulletin, we are informed, will review in all its aspects the literature of hygiene and preventive medicine with special reference to the needs of the Dominions and the tropical and other colonies and India. Dr. J. F. C. Haslam, late Government medical officer, British Guiana, recently appointed Assistant Director of the Tropical Diseases Bureau, will give most of his time to the Bulletin, and will be responsible for the Section of Applied Hygiene in the Tropics, while for the rest some 35 contributors have undertaken to assist in the provision of material. The subscription rate for the Bulletin will be 21*s.* per annum, and orders may be lodged with the Tropical Diseases Bureau, 23, Endsleigh-gardens, N.W.

JOURNALS.

JOURNAL OF PATHOLOGY AND BACTERIOLOGY. Vol. XXVIII., No. 4. Pp. 541–717. October, 1925.—The Bacteriology of Subacute Infective Endocarditis, by H. D. Wright (London), an important paper which will be made the subject of separate editorial comment.—Effect of Hæmorrhage on the Hæmolytic Titre of the Serum of Rabbits, by J. Mills (Cambridge). Rabbits immunised against sheep corpuscles were bled and the hæmolytic titre of their blood compared with its content in hæmoglobin. The two usually run parallel. Hence, either the tissue fluids from which the blood volume is made up after a bleeding contain no hæmolysin or the capillary wall is not permeable to it.—Complement Fixation with Bilharzia, by N. H. Fairley (Bombay). The active substance in worm extracts is lipoidal not protein in nature.—The Normal Weight of the Human Thymus, by A. B. Bratton (London). See p. 931.—Liver Necrosis and Cirrhosis produced Experimentally by Coal-Tar, by J. Davidson (Edinburgh). Tar painted on the skin or injected subcutaneously in rabbits causes necrosis similar to acute yellow atrophy; this may be followed by cirrhosis.—The Early Phases of Cell Injury, by J. Lorrain Smith and T. Rettie (Edinburgh). Cloudy swelling and necrosis however produced (ether, chloroform, acidosis, &c.) always show first in changes in the mitochondria.—Tuberculous Guinea-pigs and Diaplyte Tubercle Vaccination, by J. S. C. Douglas, J. W. Edington, and F. W. Simson (Sheffield). No effect on the course, extent, or duration of the experimental disease was produced by Dreyer's vaccine.—The Blood Cells of the Rabbit after Splenectomy, by R. H. Mole (Liverpool). Removal of the spleen causes a decrease of red corpuscles followed after several weeks by an increase to more than the normal number.—Observations on the Action of the Convulsant Thujone, by H. Florey (Cambridge). A pharmacological study of the active principle in absinthe.—The Preservation of Testes for Transplantation in Rabbits and Dogs, by N. M. Shustrov, S. G. Karpova, and I. V. Tikhomirov (Moscow). Rabbits' testicles may be transplanted effectively after five days in cold Ringer's solution.—Diphtheria Toxin-antitoxin Flocculation (Ramon Test), by P. J. Moloney and C. B. Wild (Toronto). The Ramon method for titrating toxin and antitoxin in vitro does well for rough tests, but there are many discrepancies between its results and those of guinea-pig tests which it cannot replace. The nature of the flocculation is not understood; it seems to have some relation to the agglutination of the bacilli.—Apparatus for Obtaining Plate Cultures of Anaerobes, by W. J. Wilson (Belfast).—Coliform Organisms in the Trachea, by N. D. Ball (London). Present in 55 of 70 unselected post mortems. Friedländer's bacillus was found eight times; the different strains failed to show any cross-agglutination.—Unusual Serum Agglutination in Typhoid Fever, by J. F. Taylor (London). Agglutinated paratyphoid A to an unusual degree.—Variation in Platelet Count after Splenectomy in Acholuric Jaundice, by S. C. Dyke (Wolverhampton). The rise and subsequent fall in the number of platelets had no relation to changes in red cells or leucocytes.—The Obituary Notices of Deceased Members (12 in number) include Two Interesting Accounts of the Early History of Bacteriology as Notices of Dr. E. Klein (1844–95), by Prof. W. Bulloch, and of Prof. C. J. Salomonsen (1847–1924), by Prof. T. Madsen.—Books received.—Annual indexes.

JOURNAL OF PHYSIOLOGY. Vol. LX., No. 3. 1925. The Effect on Muscle Contraction of Sympathetic Stimulation and of Various Modifications of Conditions. By Helene Wastl. The question whether the sympathetic system has any direct influence upon striated muscle has been widely discussed during the last ten years. Many observers who have supported the theory that such influence exists have considered

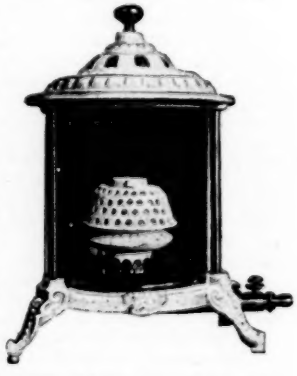
that it consists of an increase of some form of tonic contraction. So far, however, no one has been able to cause increase of muscle tone by stimulating the peripheral end of any sympathetic nerve. Other observers consider that if a muscle is fatigued its activity is more or less restored by stimulating the sympathetic—i.e., that the sympathetic has all the effects on striated muscle that it has on the heart. The author carried out a number of experiments on anæsthetised cats, but no evidence was found that the sympathetic nervous system affects striated muscle, except by modifying the circulation.—The Effect of Changes in Venous Blood Pressure on the Rate of Flow Through, and the Gaseous Metabolism of the Kidney. By E. W. H. Cruickshank and K. Takeuchi. The experiments were carried out on cats under urethane anæsthesia. An increase in the venous pressures in the renal veins produces a proportionate decrease in the blood flow through the kidneys, with an increase in oxygen used per c.cm. of blood. An increase in venous pressure up to 100 per cent. does not necessarily render the kidney anoxæmic; this is shown by the average figures for oxygen percentage saturation at the end of the experiments—viz., arterial blood 88·8 per cent., venous blood from the kidney, 69·9 per cent. For a certain time, varying from one to two hours, the kidneys under conditions of increased venous pressure amounting to about 50 to 100 per cent. utilise an amount of oxygen per c.cm. of blood, which, in relation to the blood flow, gives a constant utilisation of oxygen per minute.—The Relation of the Thyroid Gland to the Action of Insulin. By J. H. Burn and H. P. Marks. Thyroidectomy diminishes the hyperglycæmic reaction to adrenalin and increases the hypoglycæmic reaction to insulin. Thyroid feeding, so long as the glycogen store in the liver is not diminished, increases the hyperglycæmic reaction to adrenalin and decreases the hypoglycæmic reaction to insulin. When, as a result of prolonged thyroid feeding, the liver glycogen disappears, the hyperglycæmic reaction to adrenalin diminishes and the hypoglycæmic reaction to insulin increases.—On the Effect of Adrenalin on the Respiratory Centre. By Yas Kuno. Adrenalin, as known, produces apnœa by causing complete cessation of respiratory movements. From experiments on rabbits the author concludes that adrenalin does not cause apnœa by constricting the cerebral vessels, but partly by increasing the cerebral blood flow and washing out CO_2, and partly by a direct action on the nerve-cells of the respiratory centre.—On the Production of Anhydræmia with Insulin. By David L. Drabkin. Large doses of insulin in dogs cause a rapid increment in the percentage of hæmoglobin (14·5–44·2 per cent.), a great increase in the cell count, a decrease in the total blood volume, a reduction in the percentage of plasma, and also physical evidence of blood dehydration—increased viscosity and apparent anoxæmia. After large doses of insulin, associated with a rapid, pronounced hypoglycæmia, dogs invariably developed anhydræmia. Unæsthetised rabbits were irregular in their response and were found to be ill-adapted for such a study. The use of "mass" doses of insulin is essential in this type of experiment. The sudden profound hypoglycæmia—the virtual purging of the blood of its sugar—is thought to be the primary cause of the anhydræmia.—The Relation of Ovarian Function to Menstruation. By Wilfred Shaw. After a short account of the work done by other observers, the author describes first his own histological results obtained by the examination of curettings from patients who were menstruating regularly, and from some 40 specimens of the non-pathological endometrium of uteri removed by operation. Evidence suggests that the corpus luteum is responsible for the production of the pre-menstrual changes and of the decidua if pregnancy occurs.—The Relation Between the Size of the Heart and the Oxygen-Content of the Arterial Blood. By K. Takeuchi. It is known that a sufficient degree of anoxæmia produces cardiac dilatation. The experiments were made on cats anæsthetised with urethane and C.E. The chest was opened, artificial respiration maintained, and the inspired air varied in composition in four periods. Cinematograph pictures were taken of the heart beating at each period of the experiments, enlarged and measured in length, width, and area of the hearts. The percentage saturation of oxygen was determined in blood samples taken from the carotid at each period. It was found that the reduction of oxygen in the air breathed produces immediate enlargement of the heart. The readministration produces immediate reduction.—M. L. Anson and A. E. Mirsky contribute two chemical papers, one on Hæm in Nature, and the other on Helicorubin and its Relation to Hæmoglobin. By hæm is meant an iron-pyrol complex associated with a proteid in such compounds as hæmoglobin and hæmochromogen. Hæm is constantly and widely distributed in nature—e.g., hæmoglobin in the blood of all vertebrates—in a haphazard fashion, and a number of natural pigments are related to it. Helicorubin was discovered in 1876 by Sorby in the large snail *Helix aspera*. Its properties, affinities, and composition are described; its properties seem to be adaptations to the acid medium of the snail's gut in which it is found. Its function is unknown.

The other papers are: The Pulmonary Circulation in the Heart-Lung Preparation (Dog), by G. V. Anrep and E. Bulatao; The Double Innervation of the M. gastrocnemius, by S. de Boer; The Effect of Pituitary Extract on the Secretions and Composition of the Urine, by Raymond L. Stehle and Wesley Bourne; and a description of a new apparatus designed for the study of the conditions of respiration with the chest open, by K. Takeuchi, whereby artificial respiration can be maintained for nine hours or more with the chest open, without producing emphysema and which does not cause more than a trivial decrease in the oxygen saturation of the arterial blood.

New Inventions.

THE LEWCO STOVE.

THIS small circular portable gas stove has been devised for warming a room. The dimensions—12 in. high and a diameter of 8½ in.—allow of it being placed on a table or other convenient place. The external part of the stove is cast iron enamelled; it is provided with a copper reflector on the base and on half the circumference. The cover can be lifted off, and a heating surface is thus provided which may be used for boiling a kettle. The burner is a truncated cone of fine fire-clay in two parts, and so constructed that the heat is evenly distributed. There is no contact between metal and non-luminous flame. The arrangements for altering the pressure of gas and controlling the entry of air are simple and efficacious.



The stove has been tested by us to see if combustion of the gas was complete. The products of such combustion were collected, and on careful tests being made with blood no trace of carbon monoxide was found. It may therefore be used with safety in a well-ventilated room, always provided that the admixture of gas and air is correctly adjusted. We have here a practical and ingenious piece of apparatus of considerable use for a variety of purposes. The price is 35*s.* complete, in various colours, and it can be obtained from the Provincial Manufacturing Company, 12 and 13, Henrietta-street, London, W.C.